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1. **Transcultural Ancestors and the Politics of Memory: Comparative Rituals in Thailand and Mexico**
Thachamon Kamlangkuea, Kanokkarn Mueangkaew and Tashi Wangmo.....1
2. **Monitoring General Education Course Performance Using Statistical Process Control Technique: A Multi-Program Analysis**
Mary Jane A. Moralia and Consorcio S. Namoco Jr.....15
3. **Changing Representations of Economic Responsibility in Pakistani Television Advertising**
Jabreel Asghar.....34
4. **The Geopolitical Triangle: Strategic, Economic, and Security Effects of the Israel-Iran-USA Conflict on Global Stability and Trade**
Zubair Hussain, Muhammad Munib Khalid, Nahla Samargandi and Zahid Zulfiqar.....52
5. **Emotional Labor and Mental Health Problems in Working Individuals with Chronic Nonspecific Musculoskeletal Pain: Role of Psychosocial Reactions, Burnout and Relationship Quality**
Nazia Zafar, Sayyeda Taskeen Zahra and Sadia Saleem.....64
6. **China–Pakistan Economic Corridor (CPEC) and Environmental Security Challenges: Policy Responses**
Hamida Bibi, Tatheer Zahra Sherazi and Sumeera Imran.....76
7. **Advancing Self-Determination in Pre-Clinical Nursing Students: A Needs-Based Approach for Hospital Training Programs**
Rhona Sandra, Abdul Razak and Zelhendri Zen.....91
8. **Developing Unified, Ethics-Centered Standards for Applied Media Production: Evidence from Palestinian Universities**
Mahmoud Mohammad Mustafa Khlouf and Abdullah Afif Ibrahim Musleh.....105
9. **Sociolinguistic Analysis of Lexical Attrition of Pashto in Northwestern Pakistan**
Maria Rehman, Salma Naz Khattak and Hazrat Umar.....123
10. **The Growth of Renewable Energy Sector in Central Asia: Business Potential and Policy Support**
Shabir Ahmad Khan and Ghayur Ahmad.....137
11. **CPEC Sustainable Development Project: Prospects and Challenges for Gilgit-Baltistan’s Tourism Industry**
Muhammad Ismail, Iryna Tykhoneko and Noor Fatima.....149
12. **Analyzing Multidimensional Poverty in Roma Settlements: A WEFE Nexus and Machine Learning Approach**
Tabish Nawab and Snežana Radukić.....164
13. **Exploring Collocation and Semantic Prosody of English and Urdu Translation Equivalents in Cross-linguistic newspapers**
Nasir Hussain and Uzma Anjum and Tehseen Zahra.....186

Transcultural Ancestors and the Politics of Memory: Comparative Rituals in Thailand and Mexico

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Ancestor worship has often been examined within specific cultural or religious contexts, yet its role as a transcultural arena where memory, ritual, and power intersect remains underexplored in comparative scholarship. This article analyzes ancestor ceremonies in Thailand and Mexico, arguing that these practices operate beyond local religiosity to function as sites through which colonial and semi-colonial legacies are negotiated within contemporary global modernities. Drawing on postcolonial theory and transcultural memory studies, the study conducts a comparative review of ethnographic and historical literatures on Thailand's Sat Duen Sip and Mexico's Día de los Muertos. The analysis highlights shared ritual elements offerings, sacred spaces, and cyclical remembrance while also identifying divergences shaped by distinct spiritual formations and colonial experiences: Buddhist-animist traditions within a semi-colonial context in Thailand, and Catholic-indigenous syncretism under Spanish colonial rule in Mexico. Rather than treating ancestor worship as a static cultural inheritance, the article situates these rituals as evolving strategies of cultural negotiation, resistance, and identity-making. By bringing together two rarely juxtaposed cases from the Global South, this study contributes to ongoing Cultural Studies debates on ritual hybridity, transcultural memory, and alternative modernities beyond Eurocentric frameworks .

Keywords: Ancestor worship, Transcultural memory, Postcolonial ritual, Thailand and Mexico, Alternative modernities

Rituals of ancestor worship endure as vital cultural practices across the globe, yet they remain understudied as transcultural arenas where memory, ritual, and power intersect. In the context of accelerating globalization and lingering colonial legacies, these ceremonies illuminate how communities in the Global South negotiate identity, resist hegemonic narratives, and sustain alternative visions of modernity (Bhabha, 1994; Rothberg, 2009). Rather than static remnants of "tradition," ancestor worship operates as a dynamic cultural strategy that reconfigures relationships between the living and the dead, between locality and globality, and between memory and resistance (Assmann, 2011; Connerton, 1989).

Existing scholarship on ancestor veneration has largely focused on localized expressions whether in Asia, Africa, or Latin America often examining ritual form, symbolism, or continuity of belief (Nomnian &

Pillai, 2022; Mardones, 2020). While these studies enrich our understanding of cultural heritage, they rarely explore ancestor worship as a comparative phenomenon that traverses continents and historical trajectories. This gap is particularly evident in cross-regional analyses between Asia and Latin America, where colonial histories, syncretic spiritualities, and ritual practices reveal both convergences and divergences that unsettle conventional narratives of cultural difference (Erl, 2011).

This article addresses this gap by juxtaposing two geographically distant yet resonant traditions: Thailand's Sat Duen Sip festival in the southern region and Mexico's Día de Muertos (Day of the Dead). Both rituals emerge from hybrid spiritual cosmologies Buddhist-animist in Thailand and Catholic indigenous in Mexico and center on cycles of remembrance, communal gatherings, and offerings to ancestral spirits (McCleary & Simard, 2021; Enfield, 2020). Yet, the distinct colonial trajectories of Siam and New Spain have shaped divergent ritual forms and memory politics, prompting inquiry into how these traditions negotiate hybridity, bridge cultural worlds, and challenge hegemonic narratives of modernity.

Building on these shared symbolic elements of ancestor worship, it is essential to clarify why Thailand and Mexico have been selected for direct comparison in this study. Although separated by geography and shaped by distinct colonial trajectories semi-colonial encounters in Siam and Spanish colonization in New Spain both societies developed hybrid ritual forms that blend global religions with local cosmologies. Examining these traditions side by side illuminates how transcultural memory emerges not through direct contact but through parallel strategies of negotiating colonial legacies, communal identity, and alternative modernities in the Global South. This rationale positions the study beyond a descriptive cultural comparison, framing it instead as a critical inquiry into the politics of memory and ritual hybridity (Ionesov, 2022). Emphasizing how cultural institutions mediate collective memory and heritage can situate ritual hybridity within broader communicative practices. By differentiating between expressive and muted forms of ritual hybridity, the study refines postcolonial understandings of "third space" beyond contexts of formal colonial domination.

Drawing on postcolonial theory and transcultural memory studies, this article offers a critical-comparative review of ethnographic and historical literatures on Sat Duen Sip and Día de Muertos. By foregrounding ritual as a site of memory politics, the study reframes ancestor worship as an active negotiation of belonging, continuity, and resistance. In doing so, it contributes a rare cross-regional perspective to Cultural Studies bridging Asia and Latin America and advances debates on ritual hybridity, alternative modernities, and the theorization of memory from the Global South. Accordingly, this article examines how ancestor worship rituals in Thailand and Mexico negotiate colonial legacies and hybrid spiritualities, and how these practices function as cultural bridges and forms of resistance within broader transcultural memory frameworks.

Research Objectives

- To examine how ancestor worship ceremonies in Thailand and Mexico negotiate colonial legacies and shape hybrid spiritualities within their respective cultural contexts.
- To analyze the role of these rituals as cultural bridges that connect past and present while simultaneously functioning as subtle forms of resistance to hegemonic narratives of modernity.
- To explore how a comparative analysis of Thai and Mexican ancestor worship contributes to broader discussions in transcultural memory studies and postcolonial cultural theory.

Theoretical and Conceptual

Postcolonial Theory and Ritual

Postcolonial theory frames ancestor worship as a cultural practice shaped by colonial power relations and historical asymmetries (Bhabha, 1994). Thailand's rituals developed within a semi-colonial context through accommodation between animist traditions and Buddhist-nationalist reform (Keyes, 1987), while Mexico's Día de los Muertos reflects processes of hybridization forged under Spanish colonial rule (Brandes, 2006; Lomnitz, 2005). These cases illustrate Bhabha's concept of the third space through distinct configurations of hybridity muted hybridity in Thailand and expressive hybridity in Mexico shaped by

divergent colonial trajectories. Recent scholarship has extended the application of the “third space” beyond ritualized events to encompass everyday religious subjectivity. For instance, Khu (2026) demonstrate how Chinese Indonesian Buddhists negotiate ethnicity and nationality through quotidian religious practices, locating hybridity within lived subjectivity rather than ceremonial temporality. Read in dialogue with this perspective, the present study suggests that ritual hybridity constitutes only one register of hybridity among others. By focusing analytically on festivals and ceremonial time, this article foregrounds how the third space becomes publicly staged, symbolically intensified, and socially legible during ritual moments, thereby complementing existing work on everyday hybridity and refining postcolonial understandings of how hybrid identities are enacted across different temporal and social registers.

Transcultural Memory Studies

Transcultural memory shifts focus from national narratives to cross-regional flows of remembrance (Assmann, 2011; Rothberg, 2009). Ancestor worship, while locally rooted, resonates globally through shared concerns with mortality and lineage. Comparing Thai and Mexican rituals highlights parallels in offerings, altars cycles of remembrance that emerge not from direct contact but from convergent memorial strategies, revealing patterns of resilience and hybridity across Global South contexts (Erll, 2011).

Ritual and Power

Rituals, as performative practices, structure social relations and embody power dynamics through which authority and resistance are negotiated (Turner, 1967; Foucault, 1977). Ancestor worship ceremonies in Thailand and Mexico constitute contested arenas where state, religious, and local actors negotiate meaning: state-led heritage promotion often commodifies rituals, while local communities reclaim them as sites of spiritual continuity and subtle resistance (Pattana, 2018). Viewed through this lens, rituals function as dynamic sites where alternative visions of social order and modernity are enacted.

Within Cultural Studies debates, such practices can be understood through the concept of alternative modernities, which emphasize locally grounded reworkings of modernity rather than a binary of tradition versus rupture (Hall, 1996). Recent scholarship further suggests that alternative modernities do not only take collective ritual forms but also emerge as interior and ethical projects. For example, Khu and Khumairoh (2026) show how Muslim meditation practices in Indonesia negotiate modernity through self-reorientation and alternative ways of knowing and being. Read in dialogue with this perspective, the present study argues that ancestor worship represents one publicly visible modality through which alternative modernities are articulated, complementing interior and ethical forms of modern subjectivity.

Together, postcolonial theory, transcultural memory, and ritual-power analysis provide an integrated framework for examining ancestor worship as a site of hybrid negotiation, memory politics, and alternative modernities in semi-colonial and postcolonial contexts.

Methods

Research Design and Approach

This study adopts a comparative qualitative design that triangulates ethnographic observations from fieldwork conducted in southern Thailand in 2023 with a systematic critical review of historical and contemporary literature on Mexico. Rather than seeking strict methodological symmetry between the two cases, the study is intentionally structured as a review-based inquiry that prioritizes comparative interpretation over parallel data collection. This design reflects both practical constraints and a deliberate analytical choice to examine how ritual meanings are articulated and theorized across distinct scholarly and historical traditions.

Primary materials consist of peer-reviewed journal articles, ethnographic monographs, and institutional reports addressing Thailand’s Sat Duen Sip and Mexico’s Día de los Muertos. Sources were selected for their descriptive richness and interpretive value in conceptualizing rituals as contested cultural

narratives. Following Scott's (1990) framework for documentary evaluation, four criteria guided selection: accuracy, credibility, representativeness, and clarity. Eighteen documents published between 2015 and 2025 met these criteria and were deemed sufficient, as the corpus reached thematic saturation across ritual form, symbolism, and interpretive framing in both contexts.

The reliance on secondary literature in the Mexican case enables engagement with longer historical trajectories and transgenerational memory debates that would be difficult to access through short-term ethnographic observation. In contrast, the Thai case incorporates limited ethnographic observation to illuminate the contemporary enactment of ritual practices. This asymmetrical design is therefore not treated as a methodological limitation, but as an analytically productive strategy for examining ritual parallelism across differently situated epistemic and historical archives.

Comparative and Symbolic Framework

The comparative analysis draws on symbolic anthropology (Turner, 1967) to identify ritual practices and material forms—such as offerings, altars, and sacred spaces that encode cultural values and mediate ancestral memory. These symbolic elements are subsequently interpreted through postcolonial theory (Bhabha, 1994) and transcultural memory studies (Rothberg, 2009; Assmann, 2011) to examine how rituals articulate hybrid identities and negotiate hegemonic narratives of modernity across colonial and semi-colonial contexts.

By integrating these frameworks, the analysis moves beyond descriptive comparison toward theorizing ritual as a site where cultural continuity, power relations, and historical experience intersect.

Supplementary Ethnographic Observation

Although the study is primarily document-based, non-participant observation was conducted by the author during the Sat Duen Sip ceremony in Nakhon Si Thammarat, southern Thailand, in 2023. This ethnographic component is intentionally framed as supplementary rather than foundational to the analysis. Field notes documented publicly observable aspects of ritual performance, including altar arrangements, the sequencing of offerings, and the communal atmosphere of remembrance.

These observations do not function as an independent empirical dataset nor as a basis for cross-national comparison with the Mexican case; rather, they serve to sensitize the analysis to embodied, sensory, and performative dimensions of ritual that are often underrepresented in textual sources. In this sense, the ethnographic extra enriches interpretive depth without claiming methodological equivalence across cases. At the same time, this limited observational engagement does not allow for claims regarding participant interpretation, internal meaning-making, or intra-community variation, underscoring its role as an interpretive supplement rather than a comprehensive ethnographic account.

Observations were conducted in publicly accessible ceremonial spaces without interaction with participants or the collection of personal data. Accordingly, formal institutional ethics approval was not required under prevailing research guidelines.

Analytical Strategy

Data were synthesized through thematic coding along three analytical axes: (1) shared symbolic motifs linking the two traditions, such as food as a mediator between the living and the dead; (2) divergent ritual trajectories shaped by distinct colonial and religious histories (Buddhist-animist versus Catholic-indigenous); and (3) memory politics, wherein ancestor worship operates as both cultural continuity and subtle resistance under conditions of globalization.

By framing ritual as a dynamic cultural strategy rather than a static tradition, this methodological approach advances Cultural Studies perspectives by integrating symbolic interpretation with postcolonial and

transcultural memory analysis. This strategy allows the comparison to move beyond typological similarity toward theorizing how ritual operates as a flexible cultural repertoire through which communities negotiate power, memory, and belonging under uneven modernities.

Results

Ancestor Worship as Memory Politics: Transcultural Rituals in Thailand and Mexico

The Sat Duen Sip tradition in Thailand and Mexico's Día de los Muertos exemplify deeply embedded cultural practices through which communities engage with ancestry, memory, and belonging. As illustrated in Figure 1, although Thailand and Mexico are geographically distant yet positioned along comparable latitudinal zones, their ritual forms emerge from markedly different historical, religious, and colonial trajectories. This juxtaposition underscores that transcultural parallels in ancestor worship arise not from direct contact but from parallel strategies of negotiating memory, identity, and continuity within the Global South.

In Southeast Asia, ancestor worship is widely practiced as a form of merit-making and intergenerational reciprocity embedded within Buddhist-animist cosmologies (Keyes, 1987; Tambiah, 1970). In southern Thailand, the Sat Duen Sip festival emphasizes gratitude toward ancestors and wandering spirits (preta), reinforcing familial obligations and ethical conduct through offerings and temple-centered rituals (McDaniel, 2011; Pattana, 2018). These practices sustain cultural memory through routinized domestic and community-based forms, reflecting a semi-colonial historical context in which spiritual plurality persists within regulated religious frameworks rather than through overt public spectacle (Reynolds, 2006; Jackson, 1989).

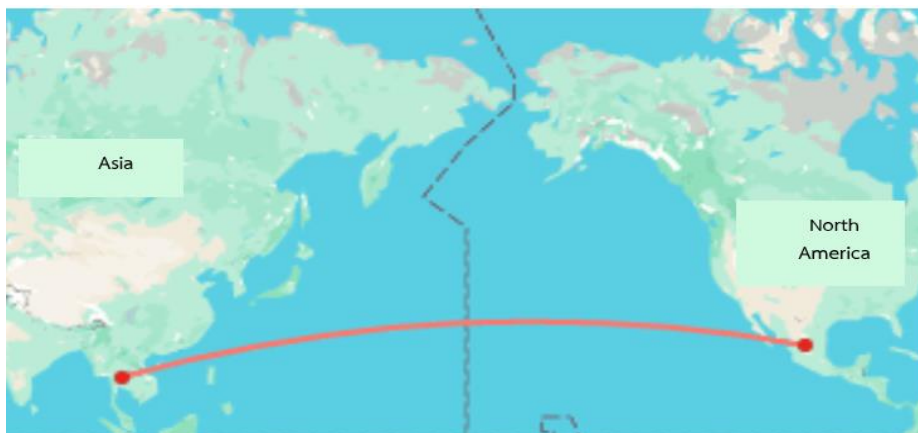


Figure 1: Map of Thailand and Mexico

Source: <https://www.google.com/maps> (2025)

By contrast, Día de los Muertos reflects a syncretic fusion of Indigenous cosmologies and Catholic traditions shaped by Spanish colonial rule (Brandes, 1998; Lomnitz, 2005). As shown in Figure 1, Mexico's ritual landscape developed within a colonial setting that produced visible and performative expressions of hybridity. Public altars (ofrendas), marigolds, ritual foods, and communal celebrations transform ancestral remembrance into a shared and nationally legible cultural practice (Carmichael & Sayer, 1991; Brandes, 2006), asserting collective identity while reclaiming Indigenous meanings within imposed religious forms.

Despite these contextual differences, both traditions share core symbolic practices most notably food offerings that mediate relationships between the living and the dead. From Mrap ritual foods in southern Thailand to Pan de Muerto and Calavera confections in Mexico, material culture operates as a tangible conduit of memory and belonging. Read alongside Figure 1, these convergences demonstrate how ancestor worship functions as a form of transcultural memory politics: locally grounded yet globally resonant practices

through which communities sustain cultural legacies, negotiate historical power relations, and assert resilience amid globalizing pressures.

A Comparative Analysis of the Sat Duen Sip Tradition in Thailand and Día de los Muertos in Mexico Using the Theory of Symbolic Behavior and Symbolic Objects in Rituals

The rituals in the Sat Duen Sip tradition in Thailand and Día de los Muertos in Mexico both involve symbolic objects used during the ceremonies, which share several similarities, though they differ slightly according to geographic location and cultural practices. Regarding the symbols in these rituals, Saipan (1996: 14-16) summarized Turner (1967) concept of ritual symbolism analysis, stating that rituals, in Turner's view, are part of a social process made up of symbols and sets of symbolic behaviors. Rituals, therefore, form a system of meaning that can be traced back to the social structure within which the ritual occurs. Understanding the meaning of symbols in rituals thus aids in comprehending the relationships that exist within the social structure as well. In studying the co-root culture in ancestor worship rituals in Thailand and Mexico, the researcher applied this approach in data analysis and found the following common features in both traditions:

The Arrangement of Ancestor Altars in the Sat Duen Sip Tradition in Thailand and Día de los Muertos in Mexico

Both Sat Duen Sip in southern Thailand and Día de los Muertos in Mexico construct ancestor altars through layered arrangements that materially encode relationships between the living and the dead. While the specific ritual objects differ, the shared use of hierarchical tiers reflects a common symbolic logic in which offerings mediate moral obligation, memory, and continuity across realms of existence.

In the *Sat Duen Sip* tradition, offerings are organized within the *Mrap* (or *Samrub*) into five ascending tiers that move from basic subsistence to ritualized and symbolic goods. Lower tiers emphasize material sustenance such as rice, dried foods, and long-lasting vegetables while upper tiers contain daily necessities, ritual sweets, and monetary or decorative items. This vertical progression symbolically maps the transition from bodily survival to moral reciprocity, reflecting a Buddhist–animist worldview in which ancestors are sustained through acts of merit-making and everyday provision.

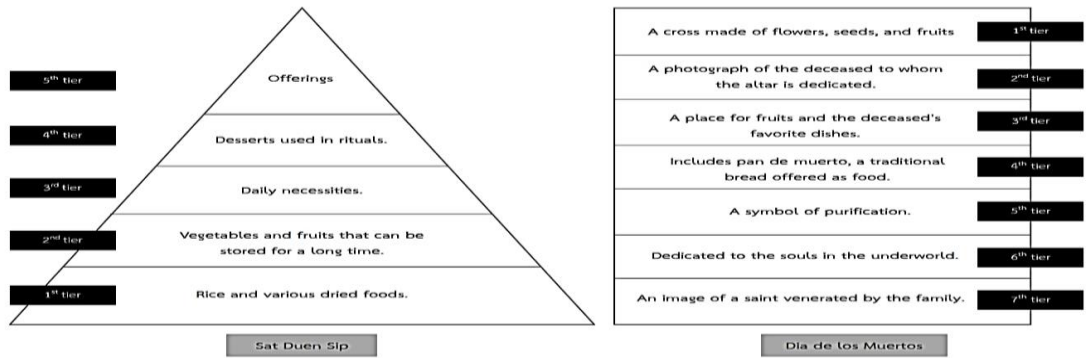
Similarly, the *Ofrenda* constructed during *Día de los Muertos* follows a stratified structure, typically comprising between two and seven layers, each associated with specific cosmological meanings (Malvido, 2006; Macedo, 2023). The arrangement incorporates photographs of the deceased, food offerings, bread for the dead (*pan de muerto*), symbols of purification, and religious icons. Rather than emphasizing material sufficiency, the *Ofrenda* foregrounds remembrance, spiritual guidance, and the soul's journey across cosmic realms shaped by Catholic and indigenous cosmologies.

Analytically, the similarity in layered altar construction across these two geographically and historically distinct traditions supports the argument for ritual parallelism without direct cultural contact. The vertical ordering of offerings operates as a shared symbolic grammar through which communities organize relationships between life, death, and morality. At the same time, the differences in altar composition reveal how ritual form is inflected by distinct historical trajectories. In the Thai case, the emphasis on consumable goods and daily necessities reflects a form of *muted hybridity*, where resistance and cultural continuity are embedded in ordinary practices rather than overt symbolism. In contrast, the Mexican *Ofrenda* exemplifies *expressive hybridity*, making syncretism between indigenous and Catholic elements visibly central to ritual performance.

By shifting attention from enumerating ritual items to interpreting their spatial and symbolic organization, this comparison demonstrates how altar arrangements function not merely as devotional

displays, but as culturally situated strategies for negotiating memory, power, and belonging under conditions of uneven modernities (see Figure 2).

Figure 2: The



hierarchical arrangement of the ancestor altars in the Sat Duen Sip Tradition in Thailand and Día de los Muertos in Mexico, which share similar characteristics.

These altar structures thus provide the material and cosmological infrastructure through which ancestral mediation becomes ritually possible.

Rituals and Symbols: Mediating the Boundary Between the Living and the Dead

In the Sat Duen Sip tradition of Southern Thailand, the sacred thread serves as a critical symbolic device that physically and metaphysically links the realm of the living with that of the deceased. This thread connects ritual loci such as the Urn of Ashes, Alms Bowl, Mrap, and Preta Grounds, establishing a liminal space where communication with ancestral spirits is made possible. This aligns closely with Turner's (1967) concept of liminality, which describes rituals as threshold moments where normal structures dissolve, enabling transformation and connection between worlds. Alongside the sacred thread, ritual offerings including flowers, incense, and candles operate as sensory mediators, materializing spiritual presence and facilitating relational bonds between the living and their ancestors. The participation of Buddhist monks as ritual intermediaries highlights the embeddedness of these practices within Buddhist cosmology and ethics, particularly the transfer of merit as a form of ongoing social and spiritual reciprocity.

Conversely, Mexico's Día de los Muertos utilizes Cempasúchil (marigold) flowers as central ritual symbols that animate the relationship between the living and the dead. As shown in Figure 3, the scattering of these flowers to form a pathway guides ancestral souls back to familial altars, symbolizing an embodied invocation and celebration of collective memory and belonging. This use of marigolds exemplifies Rothberg's (2009) theory of multidirectional memory, wherein multiple histories and cultural narratives intersect and coexist within ritual performance, allowing indigenous and colonial memories to be simultaneously recognized and reinterpreted. The vibrant color and pungent scent of the Cempasúchil, rooted in Nahuatl cosmology and colonial syncretism, are believed to attract and sustain the spirits during their earthly visitation (Macedo, 2023). This ritual use of flowers reveals a powerful transnational motif: floral offerings enact a sensory language through which ancestral presence is both evoked and maintained.

This comparative analysis elucidates how, despite differing religious and cultural frameworks Buddhist animism in Thailand and Catholic-indigenous syncretism in Mexico ritual symbols such as the sacred thread functions as a materialization of Turner's liminal space and marigolds evoke Rothberg's concept of multidirectional and identity. They facilitate encounters across temporal and spiritual boundaries, contesting linear notions of time and progress, and reaffirming intergenerational relationality.

Moreover, the use of flowers in ritual veneration reflects a broader regional and global practice, where fragrant and vibrant blooms serve as vehicles of affective and symbolic power within diverse Asian and Latin American spiritual traditions (Department of Cultural Promotion, n.d.). This shared emphasis underscores how ritual objects transcend particular religious doctrines to become sites of cultural negotiation, collective memory, and social cohesion.



Figure 3: Marigold flowers and sacred thread used in offerings during the *Sat Duen Sip* ritual in Nakhon Si Thammarat, southern Thailand.

Ritual Confections: Symbolism and Cultural Meaning in the Sat Duen Sip and Día de los Muertos Traditions

Building on this structural framework, ritual confections translate cosmological order into embodied and affective forms of ancestral engagement. Ritual confections occupy a central symbolic position in both Thailand's *Sat Duen Sip* and Mexico's *Día de los Muertos*, functioning as material mediators that translate relationships between the living and the dead into embodied, sensory forms. Rather than serving merely as consumable offerings, these sweets operate as culturally legible symbols through which moral obligation, remembrance, and continuity are enacted in everyday ritual practice.

In southern Thailand, ritual confections such as *Kanom Pong*, *Kanom La*, *Kanom Ba*, *Kanom Dee Sam*, and *Kanom Gong* encode metaphorical references to ancestral needs in the afterlife, including passage, protection, sustenance, continuity, and honor. Their placement within the *Sat Duen Sip* ritual reflects a Buddhist-animist moral economy in which care for ancestors is expressed through ordinary, reproducible food items. Analytically, these confections exemplify what this study conceptualizes as *muted hybridity*: the integration of spiritual belief and everyday material culture without overt symbolic spectacle, allowing resistance and continuity to be sustained through routine acts of provision rather than explicit ritual dramatization.

In contrast, confectionery symbolism in *Día de los Muertos* is characterized by a more visibly expressive aesthetic. Sugar skulls (*calaveras*) and *Pan de Muerto* transform mortality into a shared cultural experience by rendering death playful, edible, and visually prominent. The circular forms, decorative motifs, and ritualized consumption of these sweets foreground cyclical understandings of life and death, while marigolds and ornamental designs intensify affective engagement with ancestral presence. This mode of ritual expression aligns with *expressive hybridity*, in which indigenous cosmologies and Catholic symbolism are openly displayed and reworked through festive material culture.

Comparatively, ritual confections in both traditions operate within what Bhabha (1994) conceptualizes as a “third space,” where everyday materials are re-signified into hybrid symbols that negotiate boundaries between life and death, absence and presence, and tradition and modernity. The contrast between muted and expressive forms of confectionery symbolism demonstrates that ritual resistance and cultural continuity do not follow a single aesthetic or performative model. Instead, these edible symbols function as culturally specific languages of memory politics, enabling communities to sustain affective bonds, transmit moral values, and reaffirm collective identity through embodied and sensorial engagement with the past.

Rituals Honoring Ancestors in the Sat Duen Sip Tradition of Thailand and Día de los Muertos in Mexico

The ritual practices of the Sat Duen Sip tradition in Thailand and Día de los Muertos in Mexico converge on the shared human impulse to honor and maintain relationships with the deceased, though they manifest through culturally distinct forms and symbolic expressions. Within the Sat Duen Sip tradition, an important rite involves inscribing the names of deceased ancestors on paper, which are then ritually burned to ash and mixed with water. This water is ceremonially poured as a symbolic act of merit transfer to the departed. Rooted in Brahmanical influence, this practice resonates with the Shradha rites described by Harvey (1995), where offerings and commemorative acts serve to sustain the well-being of ancestral spirits and reaffirm familial continuity through ritual merit.

Contrastingly, Día de los Muertos centers on the presence of photographs of the deceased, prominently positioned atop the altar (Ofrenda) as focal points of remembrance and respect. Macedo (2023) elucidates that these images are often arranged so that the photograph faces away from the viewer, with a mirror placed before it, thereby reflecting the living relatives instead of the departed, as illustrated in Figure 4. This nuanced configuration symbolizes the porous boundary between life and death, inviting contemplation on the interdependence of the living and the dead within communal memory. The mirror thus becomes a metaphorical intermediary, underscoring the dialectic of absence and presence, loss and remembrance, which is fundamental to the ritual’s affective power.

Through this comparative lens, both traditions articulate complex ritual languages that negotiate the transmission of memory and the politics of ancestral honor. While their symbolic practices diverge one emphasizing ritual merit and transformation through elementally charged water, the other invoking visual presence and reflection their shared aim is to sustain the ongoing relational ties that bind communities across temporal divides.



Figure 4: The altar for honoring ancestors in the Día de los Muertos tradition of Mexico.

The Celebration of the Sat Duen Sip Tradition in Thailand and Día de los Muertos in Mexico

At the level of public ritual, the mediating logics discussed above are amplified and socially enacted through festival performances. In Nakhon Si Thammarat Province, the Sat Duen Sip tradition is enacted through the

Bun Sat Duen Sip festival, which integrates Buddhist merit-making practices with ancestral veneration and locally embedded cultural expressions. Beyond its religious function, the festival operates as a moral and pedagogical arena in which ethical values, cosmological beliefs, and local identity are actively transmitted across generations. The participation of younger community members underscores the role of ritual not merely as commemoration, but as a socially embedded mechanism for sustaining moral order and intergenerational continuity within a rapidly changing context.

By contrast, the Día de los Muertos tradition in Mexico is characterized by highly visible and performative public celebrations, including parades, cemetery rituals, and the construction of elaborate *ofrendas* (Figure 5). As Cordova (2019) observes, the festival has maintained cultural vitality not only within Mexico but also among Mexican diasporic communities, particularly in the United States. In these transnational settings, Día de los Muertos functions as a public affirmation of cultural identity, transforming remembrance into a collective spectacle that reinforces social cohesion and cultural resilience under conditions of migration and globalization.



Figure 5: The parade celebrating the Día de los Muertos festival in Mexico.



Figure 6: The procession of the Sat Duen Sip tradition in Nakhon Si Thammarat, Southern of Thailand.

While differing in scale and performative intensity, both festivals employ ritual symbolism to mediate relationships between the living and the dead. In Southern Thailand, this mediation is rendered through moralized symbolism, most notably in the incorporation of *Preta* effigies (Figure 6). Rooted in Buddhist cosmology, the *Preta* embodies the consequences of moral transgression, making ethical teachings visible and emotionally resonant. These effigies extend the ritual beyond remembrance, positioning the festival as a site of ethical reflection and social pedagogy. In contrast, Día de los Muertos emphasizes affective

engagement through celebratory aesthetics, wherein death is rendered familiar, communal, and emotionally accessible rather than morally cautionary.

Rather than reiterating ritual sequences already summarized in Table 1, this comparison highlights a shared cultural logic of ancestral mediation expressed through divergent ritual modalities. Both traditions mobilize material symbols altars, offerings, and performative practices to bridge temporal and ontological boundaries between life and death. Their differences, however, illuminate contrasting strategies for negotiating modernity and collective memory. Sat Duen Sip foregrounds moral discipline and ethical continuity within a Buddhist cosmological framework, whereas Día de los Muertos emphasizes expressive visibility and cultural affirmation within pluralistic and transnational social contexts.

Table 1

Comparative overview of the Sat Duen Sip tradition (Thailand) and Día de los Muertos (Mexico): Ritual Sequence and Symbolic Meaning

Aspect	Sat Duen Sip (Thailand)	Día de los Muertos (Mexico)	Symbolic Meaning
Ritual days	1st and 15th nights of the 10th lunar month (September-October)	November 1-2 (All Saints' and All Souls' Days)	Both reflect cyclical cosmologies of death and renewal tied to agricultural and spiritual calendars
Altars	"Mrap" with five tiers: food, tools, sweets, money	"Ofrenda" with 2-7 tiers: cross, food, Pan de Muerto, saints	Layered altars symbolize cosmological order and bridge between earthly and spiritual realms
Offerings	Five symbolic sweets (Kanom La, Kanom Pong, etc.)	Sugar skulls, Pan de Muerto, marigolds	Confections encode cultural metaphors of passage, dignity, memory, and celebration of life/death
Mediating symbols	Sacred thread linking ritual loci	Marigold flowers guiding spirits	Material mediators between living and dead, embodying liminality and multidirectional memory
Community practices	Almsgiving, merit-making, burning ancestor names	Cemetery cleaning, parades, music, costumes	Both reinforce intergenerational ties and collective memory through performative ritual
Moral/Educational role	Preta effigies teach Buddhist ethics	Mirrors on altars emphasize reflection on life/death	Ritual pedagogy transmits moral values and cultural resilience

Theoretically, this comparison contributes to debates on ritual hybridity and cultural parallelism by demonstrating that analogous ritual functions can emerge independently across cultural contexts without direct historical diffusion. These traditions exemplify parallel ritual formations, in which communities confronting distinct socio-historical conditions develop comparable symbolic responses to shared existential concerns surrounding death, memory, and belonging. Such parallelism challenges diffusionist explanations and instead highlights ritual as a flexible cultural resource through which moral values, collective memory, and social identity are continually negotiated in context-specific ways.

Ultimately, the celebration of Sat Duen Sip and Día de los Muertos illustrates how ancestor veneration operates not only as an act of remembrance but as a dynamic social practice that reconfigures identity, ethical values, and communal cohesion. By situating these festivals within a comparative analytical framework, this study demonstrates that ritual similarity does not imply cultural sameness; rather, it reveals how shared human concerns are articulated through culturally distinct yet theoretically comparable forms of symbolic practice.

Discussion

This comparative analysis of ancestor worship in Thailand (Sat Duen Sip) and Mexico (Día de los Muertos) demonstrates how ritual practices simultaneously sustain cultural continuity and negotiate modern transformations. Despite emerging from distinct cosmological traditions Buddhist-animist in Thailand and Catholic-indigenous in Mexico both rituals operate through shared cultural logics of remembrance, sacred space, and cyclical time, linking the living and the dead to reaffirm collective belonging across generations.

At the same time, significant divergences emerge in ritual scale, visibility, and institutional mediation. In Thailand, ancestor rites remain largely domestic and temple-centered, embedded in merit-making practices regulated by Buddhist calendars and monastic authority. In contrast, Mexico's Día de los Muertos functions as a highly public and performative festival, mobilizing communities, state institutions, and national heritage narratives. These differences reveal how religious hierarchies and state formations shape ritual expression, producing intimate and localized practices in Thailand and nationalized spectacles in Mexico.

These contrasts are best understood through each society's relationship to colonial power. Mexico's rituals developed under formal colonial domination, where indigenous cosmologies were subordinated to Catholicism. The resulting hybridity reflects direct confrontation between colonizer and colonized, exemplifying Bhabha's (1994) "third space" as an arena of visible negotiation and counter-hegemonic rearticulation. Thailand, by contrast, occupies a semi-colonial position in which imperial pressure operated through reform, regulation, and selective incorporation rather than rupture. Here, animist traditions persist within Buddhist orthodoxy through accommodation rather than overt resistance.

This distinction produces different configurations of hybridity. In Mexico, hybridity is expressive, public, and politicized; in Thailand, it is muted, routinized, and embedded in everyday ritual practice. Thai ancestor worship thus sustains plurality through continuity rather than symbolic opposition, complicating universalist applications of postcolonial theory that privilege confrontation as the primary mode of resistance. Ritual symbols materialize these dynamics. Sacred threads in Sat Duen Sip enact liminality within a regulated Buddhist cosmology, while marigolds in Día de los Muertos publicly stage multidirectional memory and collective belonging. Ritual foods in both contexts function within a third space, transforming everyday materials into hybrid symbols mediating tradition and change.

Finally, both traditions confront pressures from globalization, tourism, and generational change. Rather than signaling decline, these adaptations underscore ritual resilience, affirming Hall's (1996) argument that cultural identity is continuously negotiated and reshaped through social practice and collective memory. Similar dynamics of cultural preservation and adaptation have been observed in other societies facing modernization pressures, where communities actively sustain traditional cultural practices as part of collective identity (Nguyen & Khuat, 2025). Overall, the analysis advances Cultural Studies by demonstrating that third spaces in the Global South are historically contingent, producing multiple forms of hybridity and alternative modernities shaped by distinct colonial and semi-colonial trajectories.

Furthermore, the contemporary evolution of these rituals reveals a critical tension between sacred preservation and global commodification. In Mexico, the Disneyfication of Día de los Muertos, accelerated by global media and cultural industries, has transformed local memory into a visible brand of national identity, often risking the dilution of its subversive indigenous roots. Conversely, Thailand's Sat Duen Sip maintains a more localized and muted resilience against global consumerism, remaining closely tied to monastic merit-making practices. However, both contexts demonstrate that ancestor worship is not a static relic but a dynamic form of memory politics. These rituals function as a Global South response to Eurocentric modernity, illustrating how cultural traditions are mobilized to negotiate identity and social change within contemporary societies. Similar patterns of culturally embedded beliefs and ritual practices have been documented in other communities where traditions are transmitted across generations as part of collective cultural identity (Shahzad et al., 2024). Such dynamics suggest that the past is not merely a historical residue but remains an active and negotiated presence that continues to shape political and cultural belonging in the twenty-first century.

Conclusion

This study demonstrates that ancestor worship rituals in Thailand's *Sat Duen Sip* and Mexico's *Día de los Muertos* function as dynamic and transcultural sites of memory politics rather than static cultural inheritances. While grounded in distinct religious cosmologies and historical trajectories, both rituals articulate shared human concerns with ancestry, continuity, and belonging, illustrating how communities actively negotiate identity within socio-political contexts shaped by colonial legacies and contemporary globalization.

The comparative analysis shows that ritual practices, despite cultural and geographical distance, converge as strategic forms of cultural resilience and symbolic negotiation rather than overt resistance. Thailand's Buddhist-animist merit-making traditions and Mexico's Catholic-indigenous public commemorations illustrate how memory is materially and performatively mediated through offerings, sacred objects, and ritual spaces. Read through the analytical lenses of liminality (Turner), multidirectional memory (Rothberg), and the postcolonial third space (Bhabha), these cases reaffirm the continued relevance of established theoretical frameworks for interpreting hybrid ritual formations in the Global South.

Rather than treating ancestor worship as a residual or folkloric practice, this study refines existing discussions in postcolonial and transcultural memory studies by showing how such rituals operate as evolving cultural strategies through which communities sustain collective memory, negotiate power relations, and articulate alternative modernities. By bringing together two rarely juxtaposed cases from Southeast Asia and Latin America, the article offers a cross-regional perspective that extends ongoing debates on ritual, memory, and identity. In doing so, it invites further interdisciplinary and comparative research into how transcultural ritual practices continue to shape social belonging and historical consciousness in postcolonial contexts.

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Monitoring General Education Course Performance Using Statistical Process Control Technique: A Multi-Program Analysis

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This study examines the use of Statistical Process Control (SPC), with a focus on the P-chart, to monitor performance in General Education (GE) core courses in higher education. GE courses help build students' foundational knowledge and skills, so a systematic and objective evaluation is needed. The study used a quantitative research design and analyzed secondary data from three academic programs: the Bachelor of Science in Marine Biology (BSMB), the Bachelor of Science in Information Technology (BSIT), and the Bachelor of Technology and Livelihood Education (BTLEd). Data covered three academic years, from 2021 to 2024. The P-chart was used to determine the proportion of nonconforming student performance and to assess process variation and stability across programs and time. Results revealed a general trend of improvement and increased process stability, particularly in the most recent academic year. However, multiple out-of-control points were observed during the pandemic period, which may be attributed to disruptions such as limited face-to-face instruction and unstable internet connectivity. The findings demonstrate that SPC techniques are effective in identifying performance variability and pinpointing courses that require targeted instructional interventions. This study underscores the value of SPC as a tool for continuous quality improvement in GE instruction at USTP–Panaon and proposes a replicable model for integrating statistical monitoring tools into educational evaluation and quality assurance practices in higher education institutions.

Keywords: Statistical Process Control, P-chart, General Education Core Courses.

General Education (GE) core courses play a critical role in equipping students with the foundational knowledge, skills, and values necessary for academic success and professional readiness. In the Philippine higher education system, the Commission on Higher Education (CHED) underscores the importance of continuous quality improvement and outcomes-based evaluation through policy frameworks such as the *Policy-Standard to Enhance Quality Assurance (QA) in Philippine Higher Education through an Outcomes-Based and Typology-Based QA* (CHED 2012). This policy emphasizes that higher education institutions must regularly assess and enhance their academic programs, including General Education (GE), to ensure alignment with institutional outcomes, societal needs, and the demands of a rapidly evolving, knowledge-driven global environment. Complementing this, CHED Memorandum Order No. 20, Series of 2013, institutionalizes the GE curriculum as a holistic, competency-based framework designed to develop learners' intellectual, personal, and civic capacities. It further highlights the need for GE programs to remain dynamic, interdisciplinary, and responsive to contemporary challenges. As educational demands continue to evolve in response to global and

local developments, higher education institutions must adopt more rigorous, data-driven, and responsive mechanisms to sustain the quality and effectiveness of GE instruction.

Despite their importance in promoting interdisciplinary learning, improving student engagement, and supporting long-term academic success, GE courses are often evaluated using traditional assessment methods that rely heavily on subjective judgment. While these approaches provide useful insights, they may lack the precision and objectivity needed for timely, evidence-based decision-making. Prior research underscores that systematic evaluation of GE programs is essential for aligning curricular outcomes with institutional goals, strengthening quality assurance processes, and enhancing student performance (Zhao & Zhou, 2021). Moreover, continuous assessment supports institutional accountability and compliance with accreditation standards.

To address these limitations, this study explores the application of Statistical Process Control (SPC) as an alternative, data-driven approach for evaluating GE course performance. SPC, originally developed by Walter A. Shewhart in 1924, has been widely used in manufacturing to monitor process behavior, control variability, and improve quality outcomes. Over time, its application has expanded across various sectors, demonstrating its adaptability in analyzing complex systems. Recent studies highlight its effectiveness in optimizing industrial processes, such as improving packaging quality (Pimentel et al., 2022), reducing production defects (Fuentes et al., 2023), enhancing project monitoring (Vigor et al., 2022), and minimizing defects in the production of UPVC Sanitary Pipes (Cabunita & Namoco, 2024).

In educational and student services contexts, SPC which is often integrated within Statistical Quality Control (SQC), has been increasingly utilized to monitor academic performance, evaluate instructional effectiveness, and identify areas requiring intervention. Empirical studies have demonstrated its application in assessing academic program outcomes (Gessa et al., 2022), improving teaching quality (Bi, 2022), analyzing licensure examination performance (Capilitan et al., 2022). Recent research also highlights its effectiveness in enhancing service quality in higher education, such as in university cafeteria services (Moralia & Namoco Jr., 2024) and registrar operations (Chavez & Namoco Jr., 2024), demonstrating its versatility in improving both academic and institutional processes. Additionally, SPC techniques have been employed to examine grade distributions and academic trends across disciplines (Milnikova, 2011; Taiwo, 2019; Montgomery, 2009), highlighting their capacity to support data-driven decision-making in higher education.

The present study seeks to contribute to the growing body of literature advocating for SPC in higher education by applying the P-chart technique to analyze trends in student performance in GE core courses at the University of Science and Technology of Southern Philippines (USTP)-Panaon. Drawing on data from three academic programs, Bachelor of Science in Marine Biology (BSMB), Bachelor of Science in Information Technology (BSIT), and Bachelor of Technology and Livelihood Education (BTLEd) over three academic years (2021–2024), the study aims to assess variations in student performance and identify areas for improvement.

Through distinguishing between assignable and random causes of variation, this study aims to provide actionable insights into the effectiveness of GE instruction, enhance the quality of course delivery, and inform strategic program enhancements. Ultimately, the findings are expected to demonstrate the value of SPC as a quality assurance mechanism, not only for USTP-Panaon but also as a replicable model for other higher education institutions aiming to improve their general education curricula through data-driven evaluation methods.

Research Questions

RQ1. *What is the fraction of nonconforming student performance in GE core courses over three academic years in terms of program:*

- (a) *Bachelor of Science in Marine Biology (BSMB)*
- (b) *Bachelor of Science in Information Technology (BSIT) and*
- (c) *Bachelor in Technology Livelihood Education (BTLEd)?*

RQ2. *How does GE course performance compare across BSMB, BSIT, and BTLEd programs in terms of variation, trends, and process stability?*

RQ3. *How does the fraction of nonconforming student performance in GE core courses change across academic years, and what patterns of stability are observed based on P-chart analysis?*

RQ4. *Which GE core courses and programs exhibit variability or out-of-control conditions requiring intervention?*

Method

Research Design

This study used a quantitative descriptive research design. It employed Statistical Process Control (SPC) techniques, specifically the P-chart, to evaluate performance rates of General Education (GE) core courses. The P-chart, or proportion chart, is a statistical tool that monitors the proportion of nonconforming units in a process over time (Reid & Sanders, 2019). In this study, the P-chart was used to analyze variations and stability in student performance across academic programs and time periods. This approach provided a data-driven method for educational evaluation. The analysis concluded that using the P-chart facilitated the identification of trends and variations in student performance, supporting continuous improvement in GE core courses.

Research Setting

The study was conducted at the University of Science and Technology of Southern Philippines (USTP)-Panaon Campus. The institution offers three undergraduate programs Bachelor of Science in Marine Biology (BSMB), Bachelor of Science in Information Technology (BSIT), and Bachelor of Technology and Livelihood Education (BTLEd). The analysis focused on selected General Education (GE) core courses offered across the identified programs during the academic years included in the study.

Population, Sample Size, and Sampling Technique

The study used secondary data comprising official student academic records obtained from the university registrar. The population included all officially enrolled students in BSMB, BSIT, and BTLEd programs who were enrolled in selected General Education (GE) core courses from Academic Year 2021–2024.

The study employed complete enumeration or census, which involves the inclusion of every unit or member of the population in the analysis (Australian Bureau of Statistics). In this study, all available student-course enrolment records for the identified General Education (GE) core courses were included. Thus, no sampling procedure was applied in the study.

In addition, the unit of analysis was the course-level enrolment record rather than individual students, since a student may appear in multiple GE courses across academic terms. Only records from the identified GE core courses were included in the analysis, while courses outside the selected GE subjects and records with incomplete or unavailable academic information were excluded to ensure data consistency and accuracy.

Data Collection Technique and Classification

Secondary data were obtained from the university registrar and consisted of official student performance records. The analysis focused on selected General Education (GE) core courses, namely Understanding the Self (UTS), Readings in Philippine History (RPH), The Contemporary World (TCW), Mathematics in the Modern World (MMW), Purposive Communication (PurCom), Art Appreciation (ArtApp), Science, Technology, and Society (STS), and Ethics. These courses were selected based on the provisions of CHED Memorandum Order (CMO) No. 20, s. 2013, which outlines the prescribed GE curriculum for higher education institutions. This ensures that the study subjects are standardized and aligned with national

guidelines, thereby serving as the basis for inclusion in the analysis. Courses outside these identified GE subjects were excluded to maintain consistency.

Student performance was classified into two categories: conforming (passing) and nonconforming (non-passing) (Taiwo, 2019). Conforming students were those who successfully met course requirements within the prescribed period. Nonconforming students included those who received failing grades (5.0), incomplete (INC), officially dropped (ODP), or unofficially dropped (DP). These categories were grouped as nonconforming because all represent unsuccessful completion of course requirements during the academic term. In Statistical Quality Control (SQC), a nonconforming unit is any unit that does not meet the expected standard or specification (Montgomery, 2020). Since the study aimed to examine variation and process stability in academic performance using P-charts, all records indicating unsuccessful course completion were treated as indicators of nonconforming performance. However, the classification was used primarily for process monitoring and statistical analysis and does not imply that all nonconforming outcomes resulted from the same underlying cause.

Data Gathering

The researcher first obtained permission from the appropriate university offices to access official student performance records from the university registrar. The study used secondary data comprising official student performance records from core General Education (GE) courses. The GE courses included in the study were identified based on CHED Memorandum Order No. 20, s. 2013 to ensure that the subjects analyzed aligned with the prescribed GE curriculum. The collected records were organized by academic year and academic program: BSMB, BSIT, and BTLEd. Student performance was then classified into two categories: conforming (passing) and nonconforming (non-passing). Nonconforming records included students who received failing grades (5.0), incomplete (INC), officially dropped (ODP), or unofficially dropped (DP).

Data Analysis

The study employed Statistical Process Control (SPC), specifically the P-chart, to analyze variation, trends, and process stability in GE course performance across the three academic programs. The fraction nonconforming (p) was computed by dividing the number of nonconforming students by the total number of enrolled students per course. The center line (CL), upper control limit (UCL), and lower control limit (LCL) were then calculated to assess whether the observed variation fell within acceptable control limits. The resulting P-charts were used to identify trends, compare variability across programs and academic years, and determine whether the performance process was stable or affected by special causes of variation.

Construction of P-Chart

The P chart was selected as the most appropriate SPC tool for measuring the proportion of nonconforming students. The study utilizes MS Excel to construct P-charts. Below is an elaboration of its calculations:

1. Identify the nonconforming and total enrolment records. The number of nonconforming student-course records (d) and the total number of student-course enrolment records (n) were identified for each General Education (GE) core course, academic program, and academic year. The fraction nonconforming (p) was computed using the formula:

$$p = \frac{d}{n}$$

where p is the fraction nonconforming, d is the number of nonconforming student-course records, and n is the total number of student-course records for a specific course.

2. Compute the center line. It is also known as \bar{p} , was computed by dividing the total number of nonconforming records by the total number of student-course records:

$$\bar{p} = \frac{\sum d}{\sum n}$$

where $\sum d$ represents the total number of nonconforming records and $\sum n$ represents the total number of student-course records analyzed.

3. Calculate the upper and lower control limits. The upper control limit (UCL) and lower control limit (LCL) were computed using the following formulas:

$$UCL = \bar{p} + 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}}$$

$$LCL = \bar{p} - 3 \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}}$$

where \bar{p} represents the center line, and n represents the enrolment size for each course.

4. If $LCL < 0$, it was set to zero to maintain interpretability.
5. Construct separate P-charts. Separate control limits and P-charts were computed for each academic program and academic year to account for differences in enrolment size and student-course records.
6. Chart Interpretation: Data points were plotted against the control limits to assess whether the process was in control (all points within bounds) or out of control (one or more points outside bounds).

It is presumed that the process is in control and that no further intervention is required as long as the points remain within its control limits. However, any point plotted outside the range of control is seen as evidence of an out-of-control process, necessitating more inquiry to identify and address the assignable cause(s) behind this behavior (Skinner, Runger, & Montgomery, 2006).

Ethical Consideration

This study adhered to established ethical standards in the use of student academic records. Prior to data collection, formal permission to access the records was secured from the appropriate university offices, including the Campus Director, Academic Head, and the Research, Extension, and Innovation Office. The study complied with the Data Privacy Act of 2012 (RA 10173) and institutional ethical guidelines. The research utilized anonymized secondary data obtained from the university registrar; thus, all personally identifiable information, such as student names and identification numbers, was removed prior to analysis to ensure confidentiality and privacy. The data were used solely for research purposes and were securely stored in password-protected files accessible only to the researcher. Since the study involved anonymized secondary data and no direct participant involvement, it was treated as a minimal-risk study in accordance with institutional ethical guidelines.

Results and Discussion

RQ 1: *What is the fraction of nonconforming student performance in GE core courses over three academic years in terms of program: (a) BSMB, (b) BSIT, and (c) BTLED?*

Bachelor of Science in Marine Biology (BSMB)

Table 1 presents the fraction nonconforming (p) and the control limits (CL, UCL, LCL) for BSMB students' performance in General Education courses across three academic years.

A clear improvement is seen over time. In 2021–2022, several courses, particularly Art Appreciation, exceeded the upper control limit, indicating unstable performance and external disruptions. This pattern is consistent with studies showing that the sudden shift to remote learning during the pandemic negatively affected student engagement and outcomes (Daniel, 2020; Dhawan, 2020).

In 2022–2023, most values fall within the control limits, suggesting reduced variability and improved consistency. This reflects a period of adjustment in which both students and instructors became more familiar with new learning modalities (Hodges et al., 2020). By 2023–2024, all courses are within control limits and closely clustered around the center line, indicating a stable and predictable process. From a statistical perspective, this suggests that performance variation is now attributable to common causes rather than to disruptions (Montgomery, 2009).

Overall, the table shows a shift from unstable to stable performance, supporting the study's claim that student outcomes improved over time as teaching strategies and learning conditions became more effective.

Table 1
Fraction Nonconforming (p) and Control Limits for BSMB Students' Performance in General Education Core Courses

Academic Year	Course Code	Sample size (n)	Non-conforming (d)	Fraction Nonconforming (p)	Center Line (\bar{p})	Upper Control Limit (UCL)	Lower Control Limit (LCL)
2021-2022	UTS	143	30	0.210	0.221	0.325	0.117
	RPH	145	35	0.241	0.221	0.324	0.118
	TCW	111	34	0.306	0.221	0.339	0.103
	MMW	87	11	0.126	0.221	0.354	0.087
	PurCom	89	4	0.045	0.221	0.353	0.089
	ArtApp	50	22	0.440	0.221	0.397	0.045
	STS	56	11	0.196	0.221	0.387	0.055
	Ethics	47	14	0.298	0.221	0.402	0.039
	Rizal	37	8	0.216	0.221	0.426	0.016
TOTAL		765	169	2.079			
2022-2023	UTS	228	44	0.1929	0.119	0.183	0.0546
	RPH	233	31	0.1330	0.119	0.182	0.0553
	TCW	211	14	0.0664	0.119	0.186	0.0520
	MMW	99	11	0.1111	0.119	0.216	0.0213
	PurCom	98	8	0.0816	0.119	0.217	0.0208
	ArtApp	109	13	0.1192	0.119	0.212	0.0259
	STS	36	2	0.0556	0.119	0.281	0.001
	Ethics	44	6	0.1364	0.119	0.265	0.001
	Rizal	44	2	0.0455	0.119	0.265	0.001
TOTAL		1102	131	0.9418			
2023-2024	UTS	312	24	0.0769	0.083	0.1293	0.0358
	RPH	325	25	0.0769	0.083	0.1284	0.0368
	MMW	171	17	0.0994	0.083	0.1457	0.0194
	PurCom	98	8	0.0816	0.083	0.1660	-0.0008
	STS	75	7	0.0933	0.083	0.1779	-0.0128
	TOTAL		981	81	0.4282		

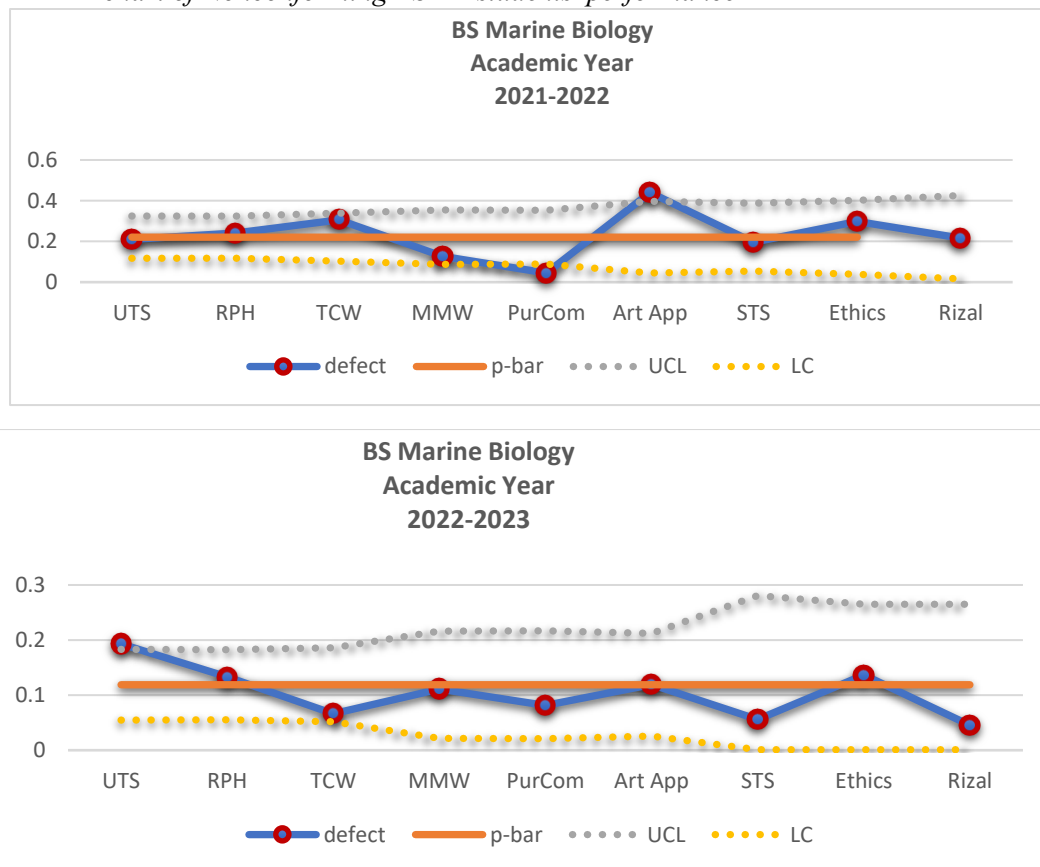
The P-chart presented in Figure 1 further illustrates the trend and stability of student performance across the three academic years. The chart shows a clear downward trend in defect rates, with earlier data points exhibiting higher variability and later points falling within the control limits. This pattern indicates a transition from an initially unstable process to a more stable and controlled system.

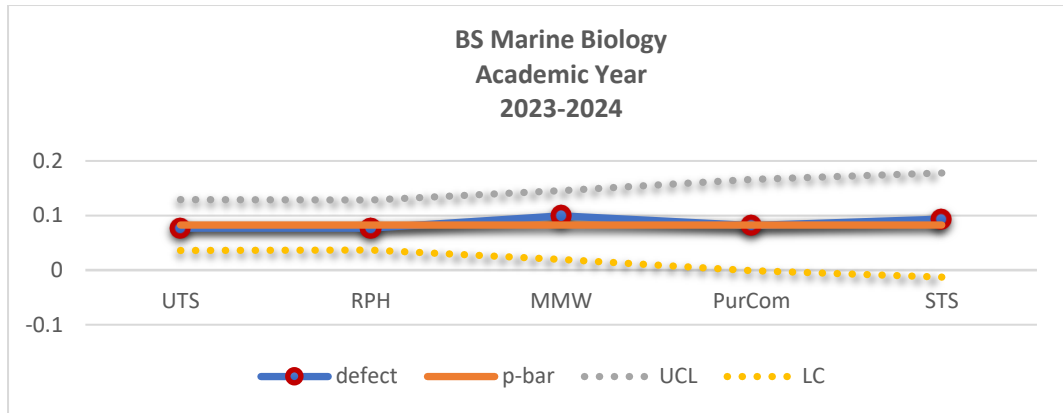
The observed reduction in variability and the clustering of data points within control limits in 2023–2024 suggest that the GE course performance in the BSMB program has achieved statistical stability. From an SPC perspective, this implies that assignable causes of variation may have been minimized, and the process has become more predictable.

Overall, the findings demonstrate that the variations in student performance across the three academic years reflect a consistent improvement trend and the attainment of process stability. This improvement may be attributed to the implementation of effective instructional strategies and the gradual transition back to face-to-face learning, which enhanced student engagement and learning outcomes.

Figure 1

P-chart of Nonconforming BSMB students' performance





The disruption caused by the COVID-19 pandemic necessitated a rapid transition from traditional face-to-face instruction to online learning, which may have contributed to challenges such as limited interaction, reduced student engagement, and technological constraints. These conditions may have contributed to the greater variability in student performance observed in the early academic years (Dhawan, 2020; Hollister et al., 2022).

However, the P-chart analysis indicates that by Academic Year 2023–2024, GE course performance in the BSMB program achieved greater process stability. This was reflected in the reduced variability and clustering of data points within the control limits, suggesting that performance outcomes became more consistent and predictable over time. From a Statistical Process Control (SPC) perspective, this may indicate that assignable causes of variation were minimized and that the educational process became more stable.

The observed improvement in student performance may be associated with adjustments in instructional delivery and the gradual transition back to face-to-face learning. Flexible learning approaches, greater familiarity with online platforms, and increased classroom interaction may have contributed to more consistent learning outcomes. Previous studies also suggest that well-structured online and blended learning environments can support student learning when adequate instructional support and interaction are present (Hodges et al., 2020). Nevertheless, these factors were not directly measured in the study and are presented only as possible explanations supported by related literature.

Bachelor's in Information Technology (BSIT)

Table 2 illustrates the performance of BSIT students in General Education Core Courses over three academic years, highlighting a significant improvement. In 2021-2022, with 484 students, the fraction nonconforming was high at 1.9909, with Art Appreciation having the highest rate (0.4063). By 2022-2023, with 524 students, the fraction nonconforming dropped to 0.6866, with notable reductions in courses like Purposive Communication (0.0339) and Art Appreciation (0.0308). In 2023-2024, further improvements were evident, with 396 students and a fraction nonconforming of 0.3032, indicating that effective interventions and strategies had enhanced student performance over the years.

Table 2*Fraction Nonconforming of BSIT students' performance in General Education Core Courses*

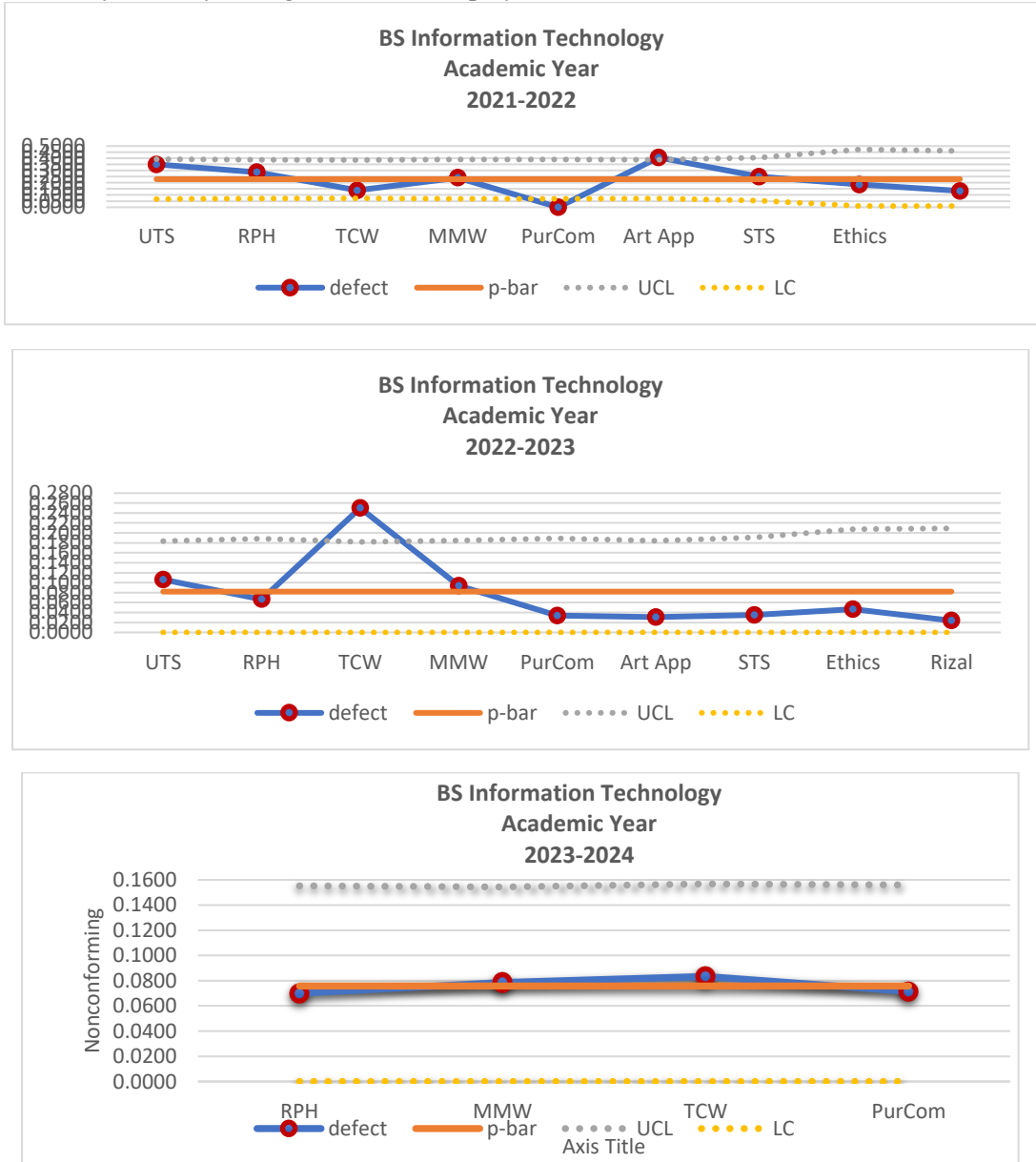
Academic Year	Course Code	Sample size (n)	Non-conforming (d)	Fraction Nonconforming (p)	Center Line (\bar{p})	Upper Control Limit (UCL)	Lower Control Limit (LCL)
2021-2022	UTS	60	21	0.3500	0.2293	0.3922	0.0665
	RPH	63	18	0.2857	0.2293	0.3882	0.0704
	TCW	65	9	0.1385	0.2293	0.3858	0.0729
	MMW	62	15	0.2419	0.2293	0.3895	0.0692
	PurCom	61	0	0.0000	0.2293	0.3908	0.0679
	ArtApp	64	26	0.4063	0.2293	0.3869	0.0717
	STS	52	13	0.2500	0.2293	0.4042	0.0544
	Ethics	27	5	0.1852	0.2293	0.4721	0.01
	Rizal	30	4	0.1333	0.2293	0.4596	0.01
<i>TOTAL</i>		484	111	1.9909			
2022-2023	UTS	66	7	0.1061	0.0821	0.1834	0
	RPH	60	4	0.0667	0.0821	0.1884	0
	TCW	68	17	0.2500	0.0821	0.1819	0
	MMW	64	6	0.0938	0.0821	0.1850	0
	PurCom	59	2	0.0339	0.0821	0.1893	0
	ArtApp	65	2	0.0308	0.0821	0.1842	0
	STS	57	2	0.0351	0.0821	0.1911	0
	Ethics	43	2	0.0465	0.0821	0.2076	0
	Rizal	42	1	0.0238	0.0821	0.2091	0
<i>TOTAL</i>		524	43	0.6866			
2023-2024	UTS	100	7	0.0700	0.0758	0.1551	0
	RPH	102	8	0.0784	0.0758	0.1544	0
	PurCom	96	8	0.0833	0.0758	0.1568	0
	STS	98	7	0.0714	0.0758	0.1559	0
<i>TOTAL</i>		396	30	0.3032			

The P-chart in Figure 2 shows a steady decline in the proportion of nonconforming student performance and reduced variability across the academic years. The greater variability observed in 2021–2022 may be associated with challenges during the transition to online learning. By 2023–2024, most data points were within the control limits, indicating improved process stability and more consistent performance outcomes.

The observed improvement and stabilization in student performance may be linked to instructional adjustments and the gradual return to face-to-face learning. Previous studies noted that online learning environments may affect student engagement due to reduced interaction (Grebennikova et al., 2022), while pandemic-related disruptions may have negatively affected student motivation and academic performance (Tan, 2021). The findings highlight the possible importance of supportive learning environments and appropriate instructional strategies in promoting more consistent academic outcomes.

Figure 2

P-chart of Nonconforming BSIT students' performance



Bachelor in Technology and Livelihood Education (BTLED)

Table 3 presents the fraction of nonconforming student performance in General Education (GE) core courses for the BTLED program across three academic years. In 2021–2022, 157 of 985 students were nonconforming, yielding a fraction of nonconforming students of 1.4303, with high nonconformance in Art Appreciation (0.3000) and Ethics (0.2358). In 2022–2023, performance improved, with the fraction nonconforming decreasing to 1.0462 among 1069 students. By 2023–2024, the fraction nonconforming had fallen to 0.3684 across 924 students, indicating continued improvement in student performance.

The P-chart in Figure 3 shows fluctuations in the proportion of nonconforming student performance across the three academic years, with earlier periods exhibiting greater variability and several out-of-control conditions, particularly in Purposive Communication and Art Appreciation. These patterns suggest

inconsistent performance outcomes during the earlier academic period. Studies have noted that communication difficulties and limited access to stable internet connectivity may affect learner participation and the effectiveness of online learning environments (Ishtiaq et al., 2024). By 2023–2024, most data points fell within the control limits, indicating improved process stability and more consistent student performance across the identified GE courses

Table 3

Fraction Nonconforming of BTLE students' performance in General Education Core Courses

Academic Year	Course Code	Sample size (n)	Non-conforming (d)	Fraction Nonconforming (p)	Center Line (\bar{p})	Upper Control Limit (UCL)	Lower Control Limit (LCL)
2021-2022	UTS	115	24	0.2087	0.1594	0.2618	0.0570
	RPH	111	24	0.2162	0.1594	0.2636	0.0552
	TCW	66	7	0.1061	0.1594	0.2946	0.0242
	MMW	139	16	0.1151	0.1594	0.2525	0.0662
	PurCom	117	2	0.0171	0.1594	0.2610	0.0578
	ArtApp	110	33	0.3000	0.1594	0.2641	0.0547
	STS	106	7	0.0660	0.1594	0.2661	0.0527
Table 3 (continued)							
	Ethics	106	25	0.2358	0.1594	0.2661	0.0527
	Rizal	115	19	0.1652	0.1594	0.2618	0.0570
<i>TOTAL</i>		985	157	1.4303			
2022-2023	UTS	154	21	0.1364	0.1169	0.1946	0.0393
	RPH	145	10	0.0690	0.1169	0.1969	0.0369
	TCW	95	8	0.0842	0.1169	0.2158	0.0180
	MMW	95	13	0.1368	0.1169	0.2158	0.0180
	PurCom	157	23	0.1465	0.1169	0.1939	0.0399
	ArtApp	107	29	0.2710	0.1169	0.2101	0.0237
	STS	100	8	0.0800	0.1169	0.2133	0.0205
	Ethics	98	7	0.0714	0.1169	0.2143	0.0196
	Rizal	118	6	0.0508	0.1169	0.2057	0.0282
<i>TOTAL</i>		1069	125	1.0462			
2023-2024	UTS	145	10	0.0690	0.0552	0.112088	0
	RPH	147	9	0.0612	0.0552	0.111699	0
	TCW	126	3	0.0238	0.0552	0.116227	0
	MMW	127	5	0.0394	0.0552	0.115986	0
	PurCom	154	17	0.1104	0.0552	0.1104	0
	ArtApp	143	4	0.0280	0.0552	0.112484	0
	STS	82	3	0.0366	0.0552	0.130849	0
<i>TOTAL</i>		396	30	0.3032			

The observed improvement in Purposive Communication may reflect the gradual stabilization of learning conditions across the academic years. Previous studies noted that learning disruptions during the pandemic affected student participation and consistency in academic performance, particularly in courses requiring active communication and participation (Pokhrel & Chhetri, 2021; Ishtiaq et al., 2024). Overall, the findings indicate a transition from greater variability to improved process stability within the BTLEd program.

Figure 3

P-chart of Nonconforming BTLE students' performance



However, there has been a noticeable improvement in the PurCom course over the years. This improvement is likely due to the return of face-to-face classes, which students prefer and which provide a more conducive environment for learning and assessments. The face-to-face format has mitigated the issues related to internet connectivity, allowing students to engage more effectively in oral presentations and other interactive activities.

The challenges and impacts of online learning during the pandemic have been widely documented. According to Pokhrel and Chhetri (2021), the sudden shift to online learning posed significant challenges for students, especially those in remote areas with limited access to technology and stable internet connections. This aligns with the difficulties faced by BTLE students in Misamis Occidental. Furthermore, the effectiveness of face-to-face learning, particularly for activities requiring real-time interaction, such as oral presentations, has been highlighted in educational research. Face-to-face interactions provide immediate feedback and foster a more engaging learning environment (Bernard, et al., 2004).

RQ2: *How does GE course performance compare across BSMB, BSIT, and BTLEd programs in terms of variation, trends, and process stability?*

Figure 4 shows that GE course performance across the BSMB, BSIT, and BTLEd programs followed a similar pattern in variation, trends, and process stability. In 2021–2022, all programs exhibited high variability, with several data points near or beyond the control limits, indicating unstable performance.

Moreover, *Art Appreciation* was consistently non-conforming across all programs, likely due to the shift to remote learning during the COVID-19 pandemic. The outbreak significantly affected the education system and required the rapid adoption of distance learning approaches, which reduced teacher-student interaction and limited personal and emotional engagement (Grebennikova et al., 2022). This may be explained by the nature of the subject, which depends on demonstration, guided practice, and interaction.

In addition, the absence of face-to-face instruction likely limited student engagement and access to immediate feedback. Since art-related tasks require clear step-by-step guidance and modeling, the online environment made learning more challenging (Pressley et al., 1992). In addition, reduced interaction in virtual settings may have further affected student performance (Dhawan, 2020).

To support learning in online settings, instructional strategies such as recorded demonstrations, step-by-step guides, and accessible materials are important. Providing visual or annotated feedback, along with opportunities for reflection and critique, can also help improve student understanding and performance (Dyment & O’Connell, 2011).

Overall, GE course performance across the three programs shows a clear trend from high variability to process stability. While all programs followed a similar pattern, minor differences in the rate of improvement were observed, with some programs stabilizing earlier than others. These findings highlight the importance of guided, interactive, and feedback-driven instructional strategies, particularly for skill-based subjects such as Art Appreciation, in achieving consistent learning outcomes across diverse instructional settings.

RQ3: *How does the fraction of nonconforming student performance in GE core courses change across academic years, and what patterns of stability are observed based on P-chart analysis?*

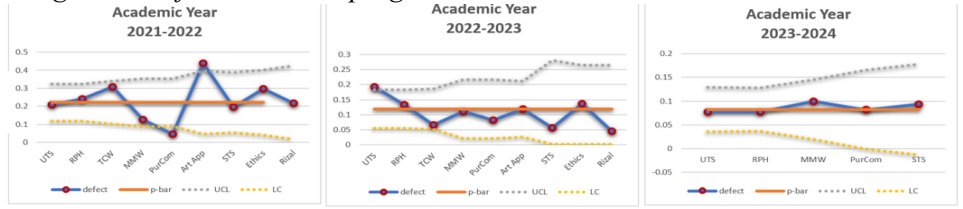
Table 4 presents the fraction of nonconforming student performance across all programs in General Education (GE) core courses over three academic years. The results show a clear and consistent improvement in student performance over time. In 2021–2022, the overall fraction nonconforming was highest at 1.7734, with Art Appreciation (0.3616), Ethics (0.2444), and Readings in Philippine History (0.2414) exhibiting the greatest nonconformance. In contrast, Purposive Communication recorded the lowest fraction nonconforming (0.0225).

In 2022–2023, the fraction nonconforming decreased significantly to 0.9331, indicating improved performance across all courses. Notable reductions were observed in Science, Technology, and Society (0.0622) and Rizal (0.0441), while Art Appreciation improved to 0.1566. By 2023–2024, the fraction nonconforming further declined to 0.4805, reflecting substantial progress and increased consistency in performance. Courses such as The Contemporary World (0.0482) and Art Appreciation (0.0280) showed marked improvement, while Purposive Communication maintained relatively low defect rates (0.0930).

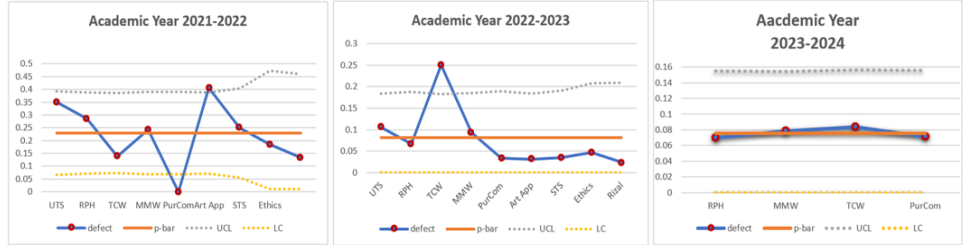
Figure 4

P-chart of Nonconforming students from the three programs

Marine Biology



Information Technology



Technology Livelihood Education

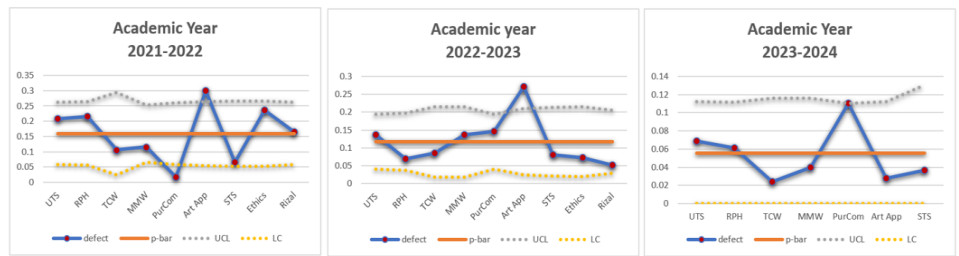


Table 4

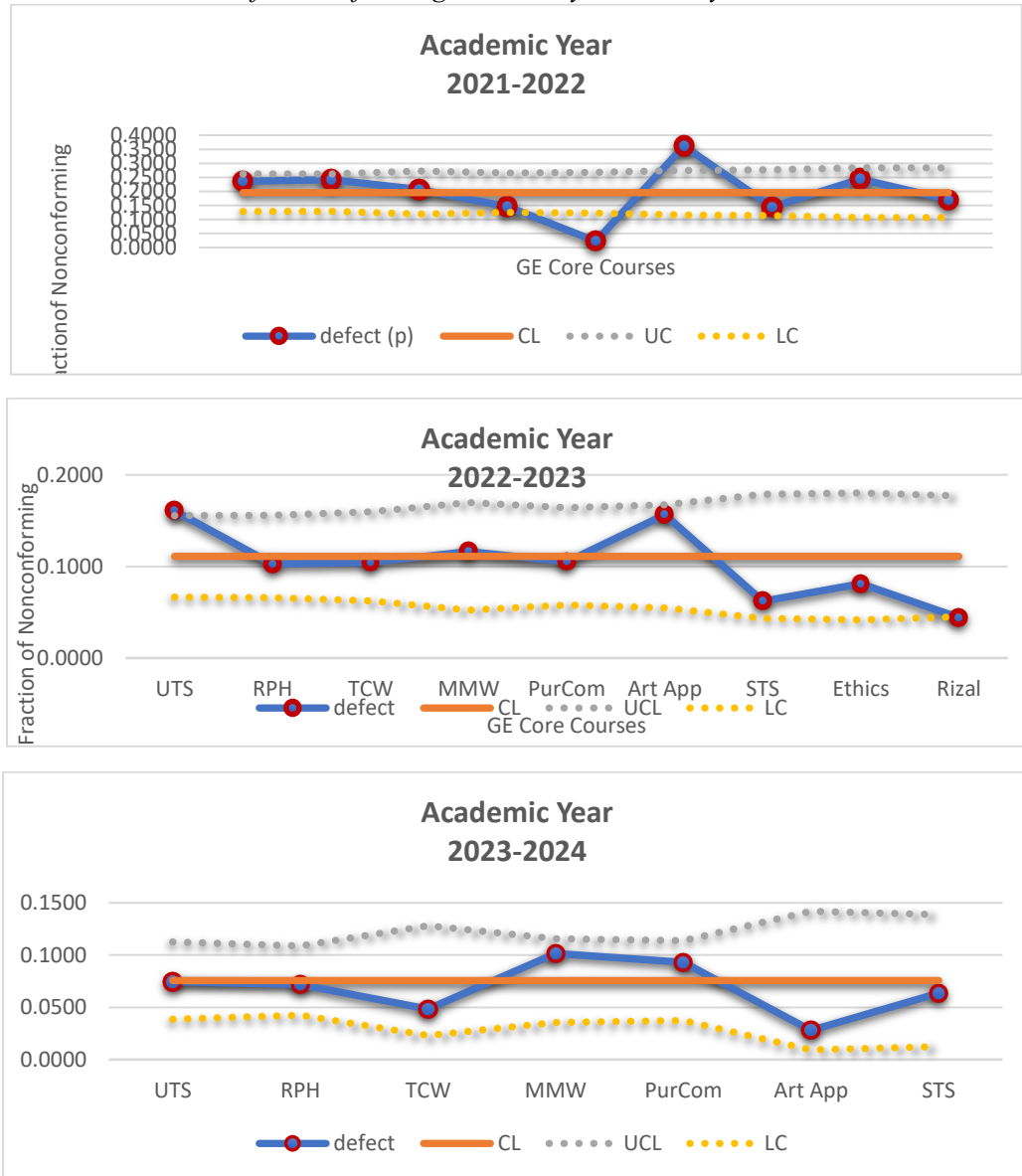
Fraction nonconformance of students for 3 academic years

Academic Year	Course Code	Sample size (n)	Non-conforming (d)	Fraction Nonconforming (p)	Center Line (\bar{p})	Upper Control Limit (UCL)	Lower Control Limit (LCL)
2021-2022	UTS	318	75	0.2358	0.1956	0.2623	0.1289
	RPH	319	77	0.2414	0.1956	0.2622	0.1290
	TCW	242	50	0.2066	0.1956	0.2721	0.1191
	MMW	288	42	0.1458	0.1956	0.2657	0.1255
	PurCom	267	6	0.0225	0.1956	0.2684	0.1228
	ArtApp	224	81	0.3616	0.1956	0.2751	0.1161
	STS	214	31	0.1449	0.1956	0.2769	0.1143
	Ethics	180	44	0.2444	0.1956	0.2843	0.1069
	Rizal	182	31	0.1703	0.1956	0.2838	0.1074
TOTAL		2234	437	1.7734			
2022-2023	UTS	448	72	0.1607	0.1110	0.1555	0.0664
	RPH	438	45	0.1027	0.1110	0.1560	0.0660
	TCW	374	39	0.1043	0.1110	0.1597	0.0622
	MMW	258	30	0.1163	0.1110	0.1696	0.0523
	PurCom	314	33	0.1051	0.1110	0.1641	0.0578
	ArtApp	281	44	0.1566	0.1110	0.1672	0.0547
	STS	193	12	0.0622	0.1110	0.1787	0.0431
	Ethics	185	15	0.0811	0.1110	0.1802	0.0417
	Rizal	204	9	0.0441	0.1110	0.1769	0.0450
TOTAL		2695	299	0.9331			
2023-2024	UTS	457	34	0.0744	0.0756	0.1127	0.0385
	RPH	572	41	0.0717	0.0756	0.1088	0.0424
	TCW	228	11	0.0482	0.0756	0.1281	0.0231
	MMW	394	40	0.1015	0.0756	0.1156	0.0356
	PurCom	430	40	0.0930	0.0756	0.1138	0.0374
	ArtApp	143	4	0.0280	0.0756	0.1419	0.0093
	STS	157	10	0.0637	0.0756	0.1389	0.0123
TOTAL		2381	180	0.4805			

The P-chart in Figure 5 shows a gradual decline in defect rates and reduced variability across the three academic years. The wider spread of data points in 2021–2022 suggests greater instability during the implementation of online learning. By 2022–2023, variability decreased as students and instructors adapted to flexible learning modalities. In 2023–2024, most data points fell within the control limits, indicating improved process stability and more consistent student performance. These improvements may be associated with adjustments in instructional delivery and a gradual transition to more stable learning environments.

Figure 5

P-chart result of nonconforming students by academic year



During the 2021–2022 academic year, the transition to online learning during the COVID-19 pandemic may have contributed to challenges in student participation and engagement. Limited interaction, unstable internet connectivity, and difficulties in using technology were identified as common barriers in online learning environments (Hollister et al., 2022; Ishtiaq et al., 2024). These conditions may help explain the greater variability observed in student performance during this period. By 2022–2023, the reduction in variability may suggest that students and instructors gradually adapted to flexible learning modalities,

including asynchronous and synchronous approaches, which may have supported improved engagement and learning management (Raes et al., 2019).

Furthermore, in the 2023-2024 academic year, the stabilization of defect rates coincided with the return to face-to-face classes, which may have provided more consistent opportunities for interaction and feedback. The return to in-person learning provided students with more direct interaction with teachers and peers, enhancing their learning experience and motivation. This stability indicates that traditional classroom settings may be more effective in maintaining consistent academic performance compared to online or hybrid models (Gillett-Swan, 2017).

RQ4: *Which GE core courses and programs exhibit variability or out-of-control conditions requiring intervention?*

The findings indicate that several General Education (GE) core courses demonstrated notable variability and out-of-control conditions, particularly during the 2021–2022 academic year. Across the three programs, Art Appreciation and Purposive Communication consistently recorded higher proportions of nonconforming outputs and greater fluctuations in the P-chart. These patterns were most evident in the BTLEd program, suggesting unstable performance and the possible presence of assignable causes requiring intervention.

Variability was also observed in the BSMB and BSIT programs during the earlier academic year, particularly in courses involving communication and performance-based activities. Previous studies noted that the transition to online learning created difficulties in engagement and participation, especially in low-resource settings (Pokhrel & Chhetri, 2021). By the 2023–2024 academic year, greater stability was observed across most courses and programs, with data points generally falling within the control limits. This trend suggests improved consistency in academic performance over time.

These findings support the principle of Statistical Process Control (SPC) that out-of-control conditions may indicate the presence of assignable causes requiring corrective action (Montgomery, 2009). In educational settings, variability in performance may be associated with instructional delivery and learning conditions (Bi, 2022). Overall, the results suggest that Art Appreciation and Purposive Communication, particularly within the BTLEd program, may benefit from strengthened instructional support and continuous monitoring to promote more stable and consistent academic performance.

Conclusion

This study established the usefulness of Statistical Process Control (SPC), particularly the P-chart, as a data-driven approach for monitoring student performance in General Education (GE) core courses at the University of Science and Technology of Southern Philippines. By analyzing student performance in the BSMB, BSIT, and BTLEd programs over three academic years, the study identified variations, trends, and levels of process stability in GE course performance. The findings showed a gradual reduction in the proportion of nonconforming students and an improvement in process stability by the 2023–2024 academic year. Most courses demonstrated more consistent performance over time, although Art Appreciation and Purposive Communication continued to exhibit higher variability and out-of-control conditions, particularly in the BTLEd program. These findings suggest the presence of assignable causes that may require focused instructional support and continuous monitoring. Overall, the study highlights the value of SPC as a practical tool for evidence-based decision-making and continuous quality improvement in higher education. The use of P-charts allowed the institution to identify courses with unstable performance and monitor improvements across academic years, providing useful information for instructional planning and academic quality assurance.

Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. Faculty handling Art Appreciation and Purposive Communication may provide more guided activities, step-by-step instructions, and regular feedback to help improve student performance.
2. Departments may conduct regular monitoring of GE course performance using P-charts to easily identify courses with high variability or increasing nonconforming rates.
3. Instructors may strengthen student support through consultation hours, remediation activities, and additional learning materials, especially for students at risk of failing or dropping courses.
4. The university may improve access to learning resources and internet support, particularly for students experiencing difficulties in online or flexible learning environments.
5. Training and workshops may be provided to faculty members on interactive teaching strategies and the use of data-driven approaches such as SPC in monitoring student performance.
6. Future researchers may examine factors such as student engagement, teaching strategies, internet connectivity, and learning preferences to better explain variations in academic performance.

Limitations

This study was limited to analyzing official student academic records for General Education (GE) core courses in the BSMB, BSIT, and BTLEd programs at a single institution. As a result, the findings may not be fully generalizable to other academic programs, universities, or educational contexts. Second, the research relied solely on secondary data and focused on the variation, trends, and process stability of student performance using Statistical Process Control (SPC). Key variables such as instructional strategies, student engagement, internet connectivity, socioeconomic status, and learning preferences were not directly measured. Any discussion of these factors was limited to interpretations supported by relevant literature. Third, the study grouped failing grades, incomplete marks, officially dropped, and unofficially dropped records as nonconforming outcomes for process monitoring. While these categories may have different underlying causes, they were combined to satisfy SPC analysis requirements and to monitor overall patterns of unsuccessful course completion. Despite these limitations, the study offers valuable baseline data on performance variation and process stability in GE core courses across academic years.

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Changing Representations of Economic Responsibility in Pakistani Television Advertising

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This study examines how economic responsibility is represented in Pakistani television advertising across two broadcast eras. It draws on a qualitative, paired diachronic comparison of four television commercials from the 1980s and the 2010s–2020s, organised into two product domains (toothpaste and life insurance). The analysis focuses on discursive framing to assess whether economic risk is constructed as a structural condition or repositioned as a matter of private anticipation and self-management. The paired design supports analytical generalisation across comparable domains rather than statistical representativeness. Findings indicate a consistent shift across both domains. Earlier advertisements foreground price, affordability, and inflation, positioning thrift as a rational response to visible economic strain. In contrast, contemporary advertisements emphasise planning, composure, and disciplined foresight. Economic responsibility becomes embedded within routine domestic coordination and anticipatory conduct, while explicit reference to structural economic pressure recedes from the narrative foreground. The study contributes to Pakistani media scholarship by demonstrating how commercial discourse participates in reorganising moral expectations of economic behaviour. It extends existing discussions of responsabilisation by showing that, in this context, responsibility is not fully individualised but relationally organised within family life. By offering a diachronic analysis grounded in Pakistan's socio-economic conditions, the article shows how televised advertising recalibrates the visibility of economic strain and normalises anticipatory discipline as a marker of responsible conduct.

Keywords: economic responsibility; moral economy; risk governance; anticipatory planning; Pakistani advertising; middle-class imaginaries

Television advertising in Pakistan has long functioned as more than a commercial instrument. It operates as a routine public text through which ideas of responsibility, security, and aspiration are normalised in everyday life. Advertising is often studied for persuasion and representation. Less attention has been given to how it reshapes the meaning of economic responsibility over time.

During the 1980s, Pakistani television operated within a state-controlled broadcast structure. Commercials from this period frequently addressed economic conditions in direct and explicit terms.

Price visibility, references to rising costs, and appeals to thrift were not peripheral elements; they were central persuasive devices. Inflation was treated as a shared and publicly recognisable condition. The consumer was positioned as someone responding to structural economic pressure. Value was measurable, and affordability was foregrounded as a rational response to economic strain.

In contrast, contemporary advertising rarely speaks the language of inflation directly. Price declarations have largely receded from the centre of televised persuasion. Instead, economic responsibility is increasingly framed through self-care, planning, wellness, and relational coordination. The responsible subject is no longer primarily the thrifty buyer navigating rising prices, but the disciplined individual who manages health, family security, and future risk through everyday choices. Economic uncertainty appears less as a structural condition and more as a matter of personal foresight and competence.

This shift is not only stylistic. It reflects a broader reorganisation of moral economy. When inflation and scarcity are translated into narratives of wellness, preparation, and lifestyle discipline, responsibility is relocated from public conditions to private conduct. Structural vulnerability becomes reframed as a matter of individual management. Advertising does not create economic insecurity, nor does it determine social behaviour. However, as a repetitive and widely consumed form of media, it participates in shaping what appears reasonable, necessary, and morally appropriate in response to uncertainty.

The present study examines this transformation through a focused comparison of selected Pakistani television commercials from the 1980s and from the 2010s–2020s. Rather than analysing advertising form in technical detail, the study asks a more direct social question: How has televised commercial discourse shifted from representing economic anxiety as a shared public condition to presenting risk management as a private responsibility? By tracing how inflation rhetoric gives way to wellness discipline and coordinated planning, the article explores how commercial media contributes to the normalisation of private coping within a volatile economic environment.

Positioning the analysis within Pakistan's socio-economic context allows the argument to remain grounded. Inflation, job insecurity, and middle-class aspiration are not abstract concerns; they are lived realities. When advertisements increasingly depict security as the outcome of correct individual conduct, they reinforce a moral framework in which adaptation is expected and structural critique is marginal. This paper therefore treats advertising not as a mirror of economic change, but as a participant in the moralisation of economic life.

Literature Review

Advertising scholarship has consistently treated commercial texts as social meaning-making rather than mere product promotion. Barthes (1972) showed how ordinary objects are transformed into “naturalised” cultural myths, while Williamson (1978) explained how advertising attaches desirable social qualities to commodities and circulates them as common sense. In this tradition, advertising functions as a cultural narrative that shapes what appears normal, aspirational, and legitimate.

Subsequent scholarship connected advertising more explicitly to economic and political arrangements. Jhally (1990) argued that consumer persuasion often obscures structural economic relations by presenting consumption as personal choice. Goldman (1992) described advertising as a system of social reading through which commodities come to signify stability, identity, and reassurance. Wernick (1991) conceptualised modern society as increasingly shaped by “promotional

culture,” where persuasion becomes routine and embedded in everyday communication. These studies suggest that advertising participates in defining responsible conduct within particular economic conditions.

Moral Economy and the Framing of Responsibility

The present study draws on the concept of moral economy to examine how economic responsibility is culturally organised. Thompson (1971) demonstrated that economic behaviour is evaluated against shared moral expectations rather than through market logic alone. Sayer (2007) later argued that everyday economic actions carry ethical judgement; individuals assess what counts as fair, prudent, and responsible. These perspectives are relevant for understanding how advertising does not simply describe products but positions particular economic behaviours as morally appropriate.

Research on media framing in South Asian contexts has demonstrated how communicative choices foreground certain interpretations while backgrounding others, thereby shaping public understandings of social realities (Devkota & Yonghong, 2025).

When inflation is foregrounded and thrift is praised, responsibility is defined in one way. When planning and self-discipline are emphasised, responsibility takes a different moral form. The shift between these framings is not purely stylistic; it signals a recalibration in how economic conduct is evaluated.

Responsibility, Risk, and the Governance of Conduct

International scholarship on risk and governance provides a useful comparative lens. Beck (1992) argues that late modern societies increasingly organise around anticipatory management of uncertainty. Giddens (1991) similarly notes that reflexive planning becomes central to everyday life under conditions of structural change. Building on this line of inquiry, Rose (1999) describes how contemporary governance operates through the cultivation of responsible, self-regulating subjects.

However, the applicability of these frameworks varies across contexts. In many non-Western societies, anticipatory planning is embedded within familial and relational structures rather than expressed through atomised individual autonomy. The shift identified in Pakistani advertising does not replicate Anglo-American neoliberal individualism in pure form. Instead, responsibilities appear relationally organised, situated within domestic coordination and shared planning rather than solitary self-entrepreneurship.

Economic Volatility and Middle-Class Adjustment in Pakistan

Pakistan’s economic history since the 1980s has been marked by recurrent inflationary cycles, currency devaluation, and periodic fiscal stabilization measures (Government of Pakistan, various years; State Bank of Pakistan, various reports). Urban middle-class households have been particularly sensitive to price instability, given their dependence on salaried income and fixed monthly expenditures. Empirical work on household budgeting and coping strategies in Pakistan indicates that families frequently adjust consumption patterns, defer purchases, and prioritise education and health during periods of inflation (e.g., Raza Cheema & Sial, 2012).

Media representations do not operate outside this context. Advertising narratives interact with existing economic anxieties rather than creating them. When price visibility declines in commercial discourse, this occurs within an environment where inflation remains publicly discussed in news

media and political rhetoric. The shift observed in the present study must therefore be interpreted against the backdrop of sustained economic volatility rather than presumed prosperity.

Inflation and Middle-Class Insecurity in Pakistan

Pakistan's economic trajectory since the 1980s has been marked by recurring inflationary cycles, fiscal stabilisation measures, and currency pressures (Government of Pakistan, 2023; State Bank of Pakistan, 2023; Ahmed & O'Donoghue, 2010). Inflation remains a persistent feature of public debate and media reporting. Official economic surveys document repeated fluctuations in food, fuel, and utility prices affecting household expenditure patterns (Government of Pakistan, 2023).

Scholarly analyses note that middle-income households experience inflation not as abstract macroeconomic fluctuation but as daily budget constraint (Zaidi, 2015). Under such conditions, consumption practices are shaped by caution, substitution, and prioritisation. The visibility of affordability discourse in 1980s advertising must therefore be read within a broader economic environment in which inflation was widely acknowledged. The later decline of explicit price reference does not indicate economic stability; rather, it signals a shift in narrative emphasis.

In more recent decades, Pakistan has experienced media expansion, urbanisation, and growth in aspirational consumer culture. However, economic volatility has persisted. The tension between aspiration and insecurity forms an important background to contemporary advertising. Understanding how commercials navigate this tension requires attention not only to representational patterns but also to economic context.

Media Deregulation and Commercial Expansion (2000–2015)

Pakistan's media landscape changed significantly after deregulation in the early 2000s. The establishment and expansion of private television channels increased competition, diversified content, and expanded advertising volume. The Pakistan Electronic Media Regulatory Authority (PEMRA) Ordinance (2002) provided a formal regulatory framework for private broadcasting. By the mid-2000s, commercial competition intensified, and brand differentiation became central to televised persuasion.

Scholars have described this period as one of rapid media transformation rather than simple liberalisation (Mezzera & Sial, 2010; Rasul & McDowell, 2012). Increased advertising budgets, celebrity endorsements, and lifestyle-oriented campaigns reflected broader commercial expansion. At the same time, regulatory codes continued to shape acceptable content, reinforcing cultural boundaries.

This institutional shift matters for the present study. The movement from state-dominated broadcasting to competitive private media environments may influence how economic responsibility is narrated. In a competitive advertising market, brands may emphasise aspiration, planning, and lifestyle positioning rather than overt price-based persuasion.

Advertising, Aspiration, and Social Mobility

Post-2000 advertising in Pakistan increasingly reflects aspirational imagery linked to upward mobility. Urban modern interiors, coordinated family life, and professional confidence become recurring motifs (Shahid & Ashfaq, 2021). While these representations signal consumption growth, they also respond to persistent economic volatility.

In emerging and transitional media economies, advertising frequently performs a dual function: affirming narratives of progress while stabilising uncertainty (Goldman, 1992; Wernick, 1991). The representation of calm domestic order and forward planning may therefore be read not only as marketing strategy but as cultural reassurance. Brands position themselves as companions in stability rather than merely suppliers of goods.

Within Pakistan's middle-class context, aspiration and insecurity coexist. Public discourse frequently acknowledges inflation and purchasing pressure, yet advertising narratives increasingly foreground composure and preparedness. This tension shapes how responsibility is framed.

The move toward planning-focused narratives can be read as a response to this condition. Rather than explicitly representing economic strain, advertising repositions responsibility within disciplined anticipation. In this framing, uncertainty is not foregrounded as a shared problem but managed through routine conduct and domestic coordination.

Neoliberal Responsibilisation and Self-Management

Recent international scholarship identifies a broader trend toward individualised responsibility in media discourse. Gill and Orgad (2018) describe how resilience narratives encourage individuals to manage uncertainty through self-regulation. Banet-Weiser (2018) shows how empowerment language often translates into expectations of continuous self-improvement. Rather than denying structural pressures, such discourse reframes them as challenges requiring disciplined personal response.

This does not imply that structural economic factors disappear. Instead, they become background conditions against which individual conduct is evaluated. Responsibility shifts from collective negotiation to private anticipation. Within advertising, this may appear as emphasis on planning, wellness, foresight, and preparation.

The relevance of this literature to Pakistan must be considered carefully. Pakistan's socio-cultural environment retains strong family-centred and relational frameworks. Individual responsibility is frequently embedded within domestic coordination rather than framed as purely autonomous self-enterprise. Therefore, if responsibilisation occurs, it is likely to be mediated through familial and moral idioms.

Pakistan-Focused Advertising Studies

Pakistan-based research on advertising has examined ethical boundaries, cultural sensitivity, and representation. Akhtar, Abbasi, and Umar (2011) analysed ethical issues in Pakistani advertising from an Islamic perspective, highlighting the importance of religious and moral norms in evaluating commercial content. Their work underscores that advertising in Pakistan operates within explicit ethical expectations.

Shahid and Ashfaq (2021) conducted a content analysis of major beverage brands across 2000–2017 and reported shifts in cultural themes, including increased emphasis on lifestyle and family-centred imagery. Although their focus was not economic framing, their findings suggest that persuasive priorities evolve in relation to broader social changes.

Recent discourse-oriented scholarship in *FWU Journal of Social Sciences* has also examined how social roles and identities are discursively constructed within institutional and public texts,

highlighting the continuing relevance of discourse-based approaches to representation and responsibility (Riaz & Ullah, 2025)

CDA-based research in Pakistan has shown how public texts structure responsibility and authority through language. Rahman (1996) and Asghar (2014) indicated how ideological perspectives are encoded in media discourse. Asghar (2021) examined how legal documents distribute obligations and power relations. Policy analysis by Asghar and Ahmad (2022) revealed how educational reforms reorganise expectations of citizenship through textual emphasis. These studies provide methodological grounding for examining how commercial discourse may similarly redistribute responsibility.

Gap in Literature

Despite this body of work, diachronic analysis of economic framing in Pakistani advertising remains limited. Studies have explored ethics, gender, and cultural representation, but fewer have examined how inflation, affordability, and planning are narrated across distinct broadcast eras. Given Pakistan's recurring economic volatility, this omission is notable.

Earlier advertisements often foregrounded price as a central persuasive feature. Contemporary campaigns appear to privilege planning and wellness as signs of responsibility. Whether this represents a broader shift from publicly acknowledged economic strain to privately managed risk requires systematic comparison.

The present study addresses this gap by analysing selected commercials from two eras within comparable product categories. By situating the analysis within Pakistan's economic and media transformations, the study moves beyond thematic description and toward understanding how advertising participates in reorganising moral expectations about economic conduct.

Research Questions

The preceding discussion indicates that advertising should not be treated merely as a reflection of economic change, but as a participant in shaping how economic responsibility is understood. In Pakistan, recurring inflation, currency instability, and middle-class economic pressure form a persistent public backdrop. Yet it remains unclear whether televised advertising continues to frame economic strain as a shared structural condition or whether it increasingly translates uncertainty into narratives of private discipline and foresight.

This study therefore seeks to examine how economic responsibility is constructed across two broadcast eras. Rather than focusing on stylistic or technical features of advertising form, the analysis centres on how economic risk is narrated and morally organised in selected Pakistani television commercials.

The study addresses the following questions:

RQ1: How is economic responsibility represented in Pakistani television advertisements from the 1980s compared to advertisements from the 2010s–2020s?

RQ2: To what extent do contemporary advertisements shift the framing of economic risk from structural conditions (such as inflation and affordability) to individual self-management (such as planning, wellness, and disciplined consumption)?

RQ3: What implicit moral expectations about “responsible conduct” emerge from this shift in framing?

These questions guide a comparative qualitative analysis of selected advertisements from two historical periods. By focusing on how responsibility is narrated rather than on technical stylistic change, the study aims to clarify whether televised advertising in Pakistan contributes to the privatisation and moralisation of economic risk.

Method

Research Design

This study adopts a qualitative comparative design to examine how economic responsibility is framed in Pakistani television advertising across two broadcast eras. The objective is interpretive rather than statistical. The study does not seek to measure how often particular themes occur, but to analyse how economic risk is narrated, positioned, and morally organised within selected commercial texts.

A qualitative approach is appropriate for such a framework because the research questions concern framing and moral expectation rather than frequency distribution. Economic responsibility may appear in subtle narrative cues, relational positioning, or the absence of explicit reference. Such features cannot be adequately captured through simple counting procedures. Instead, close textual reading allows examination of how economic strain is foregrounded, backgrounded, or translated into private conduct.

The comparative design enables structured contrast between two historically distinct broadcast environments: the state-dominated television landscape of the 1980s and the commercially expanded media environment of the 2010s–2020s. By placing advertisements from these eras side by side within comparable product domains, the study isolates shifts in framing rather than differences arising from product type or genre.

Corpus Selection

The corpus was selected using a purposive, criterion-based strategy designed to maximise comparability across broadcast eras. Three criteria guided selection: (1) domain continuity, where product categories were required to be present in both the 1980s and contemporary advertising; (2) discursive relevance, where advertisements explicitly or implicitly engaged with themes of economic responsibility, affordability, or planning; and (3) accessibility and circulation, where materials were publicly available and representative of widely broadcast campaigns rather than niche or experimental content. These criteria ensure that the selected advertisements are analytically comparable rather than incidental examples.

The corpus consists of four Pakistani television commercials organised into two product-domain pairs: toothpaste and life insurance. Each domain includes one advertisement from the 1980s and one from the 2010s–2020s, enabling structured diachronic comparison.

The 1980s corpus includes a Colgate toothpaste commercial originally broadcast on Pakistan Television (FotoBliss Photography, 2017) and a State Life Insurance commercial from the same period (Pakipop, 2007b). The contemporary corpus includes a Colgate Pakistan campaign released in 2023 (Colgate Pakistan, 2023) and a State Life Insurance campaign released in 2021 (State Life

Insurance Corporation of Pakistan, 2021). All materials are publicly accessible through broadcast archives or official brand channels.

The 1980s Colgate advertisement features a stylised “toothpaste race” narrative in which English toothpaste symbolically defeats inflation. The price “Rs. 12” appears on screen, and affordability is explicitly emphasised within a celebratory domestic setting. The contemporaneous State Life commercial centres on a young girl who sings and prays for her father’s long life, expressing gratitude for his decision to purchase life insurance.

In contrast, the 2023 Colgate campaign unfolds in a bustling airport before transitioning to an upscale domestic setting, where the father explains oral health using a citrus press analogy and the family affirms strength through a shared apple-biting moment. The 2021 State Life advertisement depicts a young couple celebrating their anniversary; playful dialogue about policy documents unfolds against a family portrait backdrop, subtly underscoring planning within affectionate domestic interaction.

These two product categories were selected for specific reasons. First, both address recurring forms of economic responsibility: routine household expenditure (toothpaste) and long-term financial planning (life insurance). Second, both were prominently advertised in the 1980s and remain active in contemporary commercial media, allowing historically comparable analysis. Third, together they capture complementary dimensions of economic conduct—everyday consumption and anticipatory security—making it possible to examine how responsibility is framed across distinct yet related domains.

The study prioritises analytical depth over numerical breadth. It does not aim to represent the full spectrum of Pakistani advertising; rather, it focuses on structured comparison within carefully selected domains. By comparing like with like across two broadcast eras, the design isolates shifts in economic framing rather than differences attributable to product type or genre.

Although the corpus is limited in size, interpretive claims are grounded in observable textual features and systematic cross-era comparison. A framing shift is treated as analytically significant only when it appears consistently across both product domains. This pairing strategy enables focused examination of how economic responsibility is narrated and moralised within Pakistani television advertising over time.

Justification for Qualitative Sufficiency

The study does not employ frequency counting or large-scale sampling because the research problem concerns framing rather than distribution. A single explicit price reference or planning statement may structure the entire logic of responsibility within an advertisement. Numerical counting would not capture such narrative organisation.

The paired comparative design strengthens internal validity. By examining the same product categories across two eras, the analysis reduces confounding variables and enhances comparability. Changes in toothpaste advertising are assessed against earlier toothpaste advertising; shifts in life insurance framing are examined within the same domain. When similar patterns emerge across both categories, the likelihood that findings reflect isolated brand strategy rather than broader discursive transformation is reduced.

This design therefore supports focused, context-sensitive analysis while maintaining methodological coherence.

Analytical Procedure

The analysis proceeded in four stages.

Stage 1: Viewing and Initial Logging

Each advertisement was viewed repeatedly. Detailed notes were recorded on verbal claims, slogans, dialogue fragments, and on-screen text. Particular attention was paid to references to price, affordability, savings, inflation, planning, foresight, wellness, and security.

Stage 2: Framing Identification

The second stage involved identifying how economic conditions were framed. Advertisements were examined for explicit economic references (e.g., price visibility, cost emphasis) and implicit economic positioning (e.g., planning without naming financial strain). The analysis focused on how the “responsible subject” was constructed in each case.

Stage 3: Within-Pair Comparison

Each 1980s advertisement was compared directly with its contemporary counterpart within the same product domain. The objective was to determine whether responsibility shifted from reactive thrift to proactive planning, or from public economic strain to private discipline.

Stage 4: Cross-Domain Validation

Patterns identified within one pair were considered analytically significant only if similar patterns appeared in at least one additional product category. This cross-domain consistency reduces interpretive overreach and strengthens analytic reliability.

Throughout the process, interpretation remained grounded in observable textual evidence. While visual and auditory elements were noted, they were analysed only insofar as they contributed to economic framing.

By situating advertising within Pakistan’s economic and media transformations, the analysis contributes to a growing body of scholarship examining how everyday texts shape moral expectations. Commercial media do not operate independently of structural realities; however, they participate in translating those realities into narratives of conduct. The relocation of inflation from persuasive foreground to narrative background illustrates how economic life becomes moralised through routine communication.

To enhance analytic transparency, coding focused on three dimensions: (1) explicit economic reference (e.g., price, affordability, inflation), (2) responsibility framing (reactive vs anticipatory), and (3) relational positioning (individual vs family-centred responsibility). Interpretations were validated through repeated viewing and cross-domain comparison to ensure consistency across product categories.

Limitations

The corpus is purposively selected and small. The findings are interpretive and cannot be generalised to all Pakistani television advertising. The study does not include audience reception analysis or interviews with advertisers, which would provide insight into production intent and interpretation.

However, the structured pairing and cross-domain validation enhance internal coherence. The aim is not statistical representativeness but analytic illumination of a specific framing shift within a defined comparative sample. The findings should therefore be read in terms of analytical generalisation rather than statistical generalisation (Yin, 2018). The objective is to refine conceptual understanding of how economic responsibility is discursively organised within comparable cases. The paired design across product domains allows for theoretical transferability, where observed patterns may inform interpretation of similar contexts without claiming universal representativeness.

Results

The comparative analysis reveals a patterned reframing in how economic responsibility is constructed across the two broadcast eras. While the product domains remain comparable—routine household care and long-term financial planning—the representation of economic strain and consumer obligation shifts in consistent and traceable ways. These shifts are observable not only at the level of theme, but also through dialogue, tonal orientation, narrative emphasis, and the presence or absence of explicit economic reference.

From Visible Inflation to Backgrounded Economic Context

In the 1980s advertisements, economic conditions are explicitly named, visually marked, and narratively foregrounded. In the toothpaste commercial from this period, the price appears on screen in bold numerals—“Rs. 12 only” (FotoBliss Photography, 2017)—while the narrator emphasises affordability using phrases such as “haar gayee mehngaayee” (inflation lost the race) and “English toothpaste baara rupaye mein laayee” (purchased English toothpaste only for Rs. 12). The commercial repeatedly directs attention to cost as a decisive factor. The camera focuses on packaging and price display, reinforcing measurable value. Economic strain is neither concealed nor softened; it functions as the persuasive centre of the message.

The 1980s life insurance advertisement frames economic security through devotional gratitude rather than technical financial explanation. A young girl sings and prays for her father’s long life, explicitly linking his decision to purchase insurance with divine blessing and familial protection (Pakipop, 2007b). The father’s reassuring smile reinforces assurance and peace. Economic security is narrated not as abstract policy structure but as moral guardianship grounded in paternal care.

The 2023 toothpaste advertisement begins in a busy airport environment before transitioning to an upscale domestic interior. The father attributes the family’s strength to strong teeth and later, wearing a cooking apron, explains oral health through a citrus press analogy. The family’s shared apple bite becomes a symbolic affirmation of strength. Economic context is not articulated; the product is framed within vitality, familial cohesion, and embodied well-being rather than cost management.

In the contemporary life insurance advertisement (State Life Insurance Corporation of Pakistan, 2021), a young wife prepares afternoon tea and is pleasantly surprised when her husband presents flowers for their anniversary. She jokingly suggests that their son might turn the policy papers into paper planes. The exchange evolves into affectionate banter about the importance of those documents, framed against a family portrait. Planning is embedded within playful domestic interaction rather than framed as solemn precaution. Across both domains, this shift is consistent.

Reframing Responsibility: From Reactive Thrift to Proactive Foresight

In the 1980s corpus, responsibility appears as reactive. Consumers are portrayed as responding to visible inflation and financial constraint through prudent decision-making. The toothpaste advertisement emphasises affordability and price visibility, with the product presented as defeating inflation through accessible cost. Responsibility is defined through careful expenditure under economic pressure.

The 1980s life insurance advertisement frames responsibility through devotional reassurance rather than technical financial explanation. A young girl sings and prays for her father's long life, explicitly connecting his purchase of insurance to divine protection and familial security. The father's calm smile reinforces assurance. Responsibility is thus represented as paternal guardianship grounded in moral duty rather than abstract financial calculation.

In the contemporary life insurance advertisement, the logic changes. Planning is no longer framed as reaction but as anticipation. The couple's discussion unfolds in a calm and cooperative tone. Preparedness is integrated into everyday relational interaction rather than presented as emergency precaution. Responsibility becomes shared and forward-looking rather than singular and protective.

The contemporary toothpaste commercial extends this anticipatory framing. Dental care is positioned not as cost-saving behaviour but as embodied strength linked to confidence and well-being. The repeated emphasis on "rozana dekh bhaal" (daily care) reinforces habit formation. Responsibility is defined through maintenance and foresight rather than visible financial calculation.

In both product domains, responsibility shifts from protecting limited resources to managing future stability. Thrift recedes as a central moral marker, while foresight and disciplined anticipation gain prominence.

Tone and Emotional Register

Tone undergoes transformation across eras. The 1980s advertisements adopt a direct and explanatory style. Narration is authoritative and instructional. The viewer is addressed as a rational decision-maker operating within financial constraints. Even when familial warmth is depicted, the persuasive emphasis remains anchored in cost and protection. Background music is functional and unobtrusive, supporting informational clarity rather than emotional immersion.

In contrast, the contemporary advertisements employ a softer emotional register. Music is ambient and reassuring. Dialogue is conversational and relational. Visual pacing allows moments of shared domestic interaction. The narrative environment suggests stability rather than urgency.

This tonal recalibration reinforces the broader shift from public economic strain to private emotional balance. Earlier commercials assume economic anxiety as a shared starting point; later commercials assume aspiration, coordination, and preparedness as normative conditions.

Domestic Framing and Relational Coordination

Domestic representation further illustrates this shift. In the 1980s life insurance advertisement, responsibility is tied to the male provider role. The economic subject is singular, and protection flows downward from father to dependents. Authority and obligation are concentrated.

In the contemporary life insurance advertisement, responsibility is relational. Both partners participate in discussion. Planning is framed as mutual care rather than unilateral provision. The emphasis falls on coordinated preparation within a stable domestic unit.

The contemporary toothpaste advertisement situates responsibility within embodied vitality rather than instructional routine. The father's analogy using a citrus press and the family's shared apple bite symbolically link dental care to strength and resilience. Economic strain is not referenced; instead, responsibility is framed as maintaining physical robustness and familial cohesion. The product becomes a marker of strength rather than a tool of budget-conscious discipline.

Across both domains, responsibility becomes less about managing visible economic hardship and more about sustaining composure and preparedness within family life.

Cross-Domain Consistency

The observed shifts are not confined to a single product category. In both toothpaste and life insurance advertisements, explicit price references and overt economic language diminish in the contemporary corpus. In their place, vocabulary of planning, confidence, composure, and coordination becomes central. Table 1 summarises the cross-domain patterns identified in the analysis and highlights the recurring shifts across the two broadcast eras.

Absence as Framing: What Is No Longer Said

An important feature of the contemporary corpus concerns absence. In the 1980s advertisements, inflation and affordability function as explicit anchors. Numerical cost, savings claims, and financial protection are articulated directly. Economic vulnerability is visible within the narrative.

In the contemporary advertisements, explicit economic reference largely disappears. None of the later commercials display numeric cost on screen. Affordability is not foregrounded, even in a product category where price competition remains relevant. Instead, emphasis shifts toward emotional reassurance, relational stability, and long-term preparedness.

This absence is not neutral. By removing overt reference to inflation or cost pressure, the advertisement reduces the narrative salience of structural economic strain. Economic conditions remain socially present, but they are repositioned as background assumptions rather than foreground problems.

In the contemporary life insurance advertisement, rising expenses or income instability are not mentioned. Planning is embedded within affectionate everyday interaction rather than framed as reaction to crisis. Economic considerations are presumed but not dramatized.

From a discursive standpoint, silence contributes to framing. When inflation is no longer narrated, responsibility shifts from context to conduct. The economic environment recedes from persuasive foreground, while disciplined behaviour becomes central.

This pattern reinforces the broader finding: contemporary advertising does not deny economic uncertainty but relocates it from explicit articulation to implicit management.

Table 1*Cross-Domain Comparison of Economic Framing Across Eras*

Analytical Dimension	1980s Toothpaste	2010s–2020s Toothpaste	1980s Insurance	2010s–2020s Insurance
Price Visibility	Explicit (“Rs. 12 only”); affordability foregrounded	No price reference	Paternal protection framed through devotional gratitude	No cost reference; focus on planning
Economic Context	Inflation implicitly acknowledged	Economic context backgrounded	Income stability implied	Structural risk unarticulated
Responsibility Model	Reactive thrift; wise spending	Routine self-care; disciplined maintenance	Paternal provision	Shared anticipatory planning
Tone	Direct, instructive, explanatory	Calm, relational, aspirational	Protective, provider-centred	Collaborative, composed
Domestic Framing	Budget-conscious household	Harmonious modern family	Male breadwinner focus	Coordinated couple dynamic
Temporal Orientation	Present cost management	Future-oriented stability	Security against loss	Normalised foresight

Summary of Results

The 1980s advertisements foreground inflation, affordability, and visible financial protection. Responsibility is reactive and explicitly economic.

The 2010s–2020s advertisements background explicit economic strain and foreground planning, composure, and relational coordination. Responsibility becomes normalised preparedness in routine conduct.

Across both domains, economic risk is repositioned from public reference to private management. Stability is narrated not as relief from inflation, but as the outcome of disciplined preparation and everyday foresight.

Discussion

The findings indicate a shift from explicit economic articulation to normalised preparedness. This shift is visible in the movement from price-based persuasion to planning-based narratives across both product domains. In the 1980s advertisements, inflation and affordability were foregrounded as shared structural conditions. In the contemporary corpus, economic strain recedes from narrative centre and responsibility is repositioned within routine domestic planning and relational foresight. The shift partly reflects Beck’s concept of anticipatory risk governance. However, in this case, anticipation is organised within domestic and relational contexts rather than abstract individual autonomy.

This finding aligns with prior work suggesting that advertising discourse increasingly translates structural economic pressures into narratives of individual conduct (Jhally, 1990; Goldman, 1992). However, the present analysis extends this literature by demonstrating that such translation in the Pakistani context is not purely individualising but relationally organised. While studies of neoliberal responsabilisation emphasise autonomous self-management, the data here indicate that responsibility is redistributed within domestic coordination rather than displaced onto isolated individuals. This relational redistribution extends the account of Gill and Orgad (2018) by showing

that responsabilisation does not operate solely through individualisation but may be organised through domestic coordination and shared conduct.

The reduced visibility of price and affordability markers supports Jhally's (1990) argument that advertising discourse obscures structural economic relations by repositioning them within consumption narratives. In this case, inflation is not denied but displaced from explicit articulation to implicit management.

This pattern aligns with broader discussions of risk individualisation in contemporary media discourse. Gill and Orgad (2018) argue that contemporary discourse frequently translates structural pressures into expectations of resilience and self-regulation. Banet-Weiser (2018) similarly observes that empowerment narratives often operate as calls for continuous self-management. The advertisements analysed here reflect a comparable movement, though articulated within culturally specific domestic frameworks rather than overt individualism.

However, the shift observed here does not replicate Anglo-American models of neoliberal autonomy centred on atomised self-enterprise. In the Pakistani context, responsabilisation remains embedded within familial coordination and domestic interdependence. Normalised preparedness is articulated relationally—through couples planning together and parents guiding children—rather than through isolated self-optimisation. The transformation therefore suggests a culturally mediated form of responsabilisation rather than a simple transfer of Western neoliberal individualism

Economic Insecurity and the Middle-Class Imaginary in Pakistan

To understand the implications of this shift, it is necessary to situate it within Pakistan's middle-class condition. Urban middle-class households operate within an environment marked simultaneously by aspiration and instability. Education, healthcare, housing, and savings demand sustained planning, yet inflationary cycles repeatedly disrupt purchasing power. Public discourse—particularly in news media and political debate—frequently centres on rising prices and economic volatility.

Analyses of Pakistan's middle class describe it as simultaneously aspirational and economically cautious (Zaidi, 2015). Educational investment, property acquisition, and professional stability remain central ambitions, yet these unfold within recurring economic instability. Advertising narratives that foreground orderly domestic planning may therefore resonate with this tension. Rather than promising dramatic upward mobility, contemporary campaigns frequently emphasise continuity and preparedness.

Against this backdrop, advertising appears to recalibrate how economic anxiety is narrated. Earlier commercials mirror price consciousness directly, with affordability functioning as a central persuasive element. Contemporary campaigns rarely dramatise inflation. Instead, they construct stable domestic environments in which planning appears normal, achievable, and morally expected.

This shift does not remove economic instability from social reality. Rather, it displaces it from narrative foreground to background assumption. Responsibility is no longer demonstrated through visible thrift but through composure, coordination, and anticipatory conduct within everyday life.

The State Life advertisements make this shift particularly visible. In the 1980s commercial, economic responsibility is concentrated in the male breadwinner figure, who secures financial protection for dependents. Responsibility is protective and unilateral. In the contemporary campaign,

planning is dialogic and shared. The couple engage in playful dialogue about the policy papers during an anniversary moment, situating planning within affectionate domestic exchange. This shift indicates not only a change in tone, but a redistribution of economic responsibility within the household.

This representation corresponds to a middle-class imaginary of order in which composure, continuity, and disciplined planning function as visible markers of economic competence. The home is depicted as calm, organised, and future-oriented. Conversations about insurance or hygiene unfold without visible urgency. Economic instability remains socially real, but it is displaced from narrative foreground. Preparedness becomes the expected moral response to uncertainty.

Respectability reinforces this orientation. In the contemporary toothpaste advertisement, dental care is associated with strength and confident self-presentation. In the life insurance commercial, coordinated planning signals responsible adulthood and relational maturity. Responsibility is thus aligned with composure, discipline, and visible stability. Economic anxiety is not externalised; it is internalised and managed through conduct.

Importantly, contemporary advertisements embed responsibility within family coordination rather than presenting it as purely individualistic. Couples deliberate together. Parents guide children. Responsibility remains relational, yet its content shifts—from managing limited resources toward sustaining orderly anticipation. Economic conduct becomes habitual rather than reactive.

This recalibration may reflect broader socio-economic pressures. In a context where structural volatility persists, overt emphasis on inflation may no longer function as persuasive reassurance. Brands instead position themselves as companions in stability. Planning becomes an ordinary life practice rather than an emergency measure. The commercial message suggests that security results from disciplined continuity rather than episodic response.

Moral Reorganisation

This shift represents more than discursive adjustment. It reflects a recalibration of the standards used to evaluate economic conduct. In the earlier advertisements, thrift functioned as the primary marker of prudence; responsible conduct was indicated through visible cost-awareness. In the contemporary corpus, foresight and disciplined anticipation become the dominant evaluative criteria. As Thompson (1971) and Sayer (2007) argue, economic practices are always morally evaluated. The recalibration observed here shifts moral emphasis from reactive thrift toward anticipatory composure. The shift from visible thrift to anticipatory composure aligns with Arlie Russell Hochschild's broader observation that economic life is increasingly evaluated through emotional and behavioural management rather than material constraint, although here this process is anchored in routine domestic practice.

This recalibration partially supports Sayer's (2007) argument that economic conduct is morally evaluated, but extends it by showing how the evaluative criteria themselves shift historically within media discourse. In earlier advertisements, thrift functions as visible moral compliance; in contemporary campaigns, composure and anticipation become the dominant moral indicators.

Adaptation Rather Than Rupture

It is important not to overstate the transformation. Contemporary advertisements do not abandon collective values. Family cohesion, relational coordination, and domestic continuity remain

central. The shift is adaptive rather than revolutionary. Responsibilisation occurs within culturally familiar frameworks rather than through overt individualism.

What changes is not the presence of family, but the meaning of responsible conduct within it. Public acknowledgement of inflation diminishes, while private anticipation intensifies. Responsibility shifts from visible reaction to normalised preparedness and embodied stability.

Implications for Media and Public Discourse in Pakistan

The implications of this shift extend beyond advertising as a commercial practice. They invite reflection on how economic realities are publicly narrated and privately absorbed within Pakistan's media environment.

Public discourse in Pakistan frequently centres on inflation, rising utility costs, and economic volatility. In contrast, the advertisements analysed here reduce direct reference to price and affordability. Economic strain is not denied, but repositioned as a background condition, while responsibility is articulated through private conduct within domestic life.

This shift has implications for media literacy. Advertising operates not only as product promotion but as a subtle framework for evaluating behaviour. Recognising how responsibility is framed—whether through thrift or anticipatory composure—can strengthen critical awareness of how commercial narratives translate public issues into private expectations.

From a governance perspective, this pattern aligns with broader shifts in how responsibility is communicated in public culture. O'Malley (2004) notes that risk governance increasingly operates by encouraging individuals to anticipate and manage potential instability. In the Pakistani advertising context, such encouragement is embedded within culturally familiar domestic scenes rather than abstract policy language. The commercial narrative does not overtly instruct; it normalises responsibility and renders planning routine.

Culturally, the shift reinforces expectations of preparedness within domestic life. Contemporary advertisements situate responsibility within family coordination. Couples plan together; parents guide children; routine care signals maturity. These portrayals resonate with established values of cohesion and respectability. At the same time, they may intensify moral pressure on households to maintain composure despite structural strain.

Commercial media do not determine economic policy or household decision-making; however, their routine circulation contributes to stabilising particular interpretations of what counts as reasonable and responsible conduct under conditions of uncertainty. The implications, therefore, concern participation rather than causality.

The findings suggest that Pakistani television advertising does not erase economic strain but redistributes how it is publicly recognised. Inflation recedes from explicit articulation, while preparedness, composure, and embodied stability become normative expectations within domestic life. Responsibility is no longer suggested through visible thrift but through disciplined continuity and relational foresight. This recalibration does not dissolve structural volatility; it repositions how its moral response is framed. These findings should therefore be interpreted as indicative patterns within a bounded comparative corpus rather than as claims of universal transformation. In doing so, commercial discourse participates in redefining how economic responsibility is recognised, evaluated, and performed within everyday domestic life in contemporary Pakistan.

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The Geopolitical Triangle: Strategic, Economic, and Security Effects of the Israel-Iran-USA Conflict on Global Stability and Trade

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The Israel-Iran-USA triangle has emerged as one of the most structurally consequential geopolitical formations of the contemporary international system, generating effects that extend far beyond the Middle East into global trade, energy security, maritime stability, and multipolar realignment. Drawing on balance of power and balance of threats frameworks, this paper examines the triangle's strategic, economic, and security dimensions through a qualitative analytical design supported by selected empirical indicators. The paper argues that the conflict has transcended indirect rivalry and proxy confrontation to become a self-reinforcing system of regional and global instability. Geopolitically, it has accelerated regional polarization, reshaped alliance behavior, and drawn in external powers including China, Russia, India, and Pakistan. Economically, it has exposed critical maritime chokepoints, intensified sanctions-driven fragmentation, advanced de-dollarization, and generated persistent energy market volatility. In security terms, it has deepened proxy warfare, eroded deterrence predictability, and elevated nuclear risk. The study concludes that the Israel-Iran-USA conflict constitutes a multidimensional conflict system whose regional and global consequences are structurally inseparable.

Keywords: *Israel-Iran-USA triangle, geopolitical rivalry, economic coercion, proxy warfare, nuclear risk, global trade and stability*

The Israel-Iran-USA triangle is one of the most systemically significant geopolitical formations of the current international system. Beyond being a diplomatic pact among three nations. It is an auto-reinforcing conflict mechanism, fueled by a mix of ideological animosity, strategic residual mistrust, sanctions regimes, proxy confrontation, nuclear anxiety, and great-power competition (Kamrava, 2018; Parsi, 2005; Rodman, 2013). The three countries' relationship is not a traditional regional confrontation but instead consistently produces impacts on maritime security, the global energy market, alliance politics and the overall struggle of international order.

The Israel-Iran relationship has historically not been necessarily adversarial. In Pahlavi period there was a level of strategic pragmatism between the two states (Parsi, 2005; Menashri, 2006). This relationship was completely changed with the outcome of the Islamic Revolution of 1979, when Iran took an ideologically new stance against Israel and the United States (Buonomo, 2018; Ben Aharon, 2024). These divisions were

compounded when Iran's regional aspirations, Israel's nuclear and missile concerns, and America's strategic commitments were fundamentally at odds with each other following the Cold War reordering and the 1991 Persian Gulf war (Kamrava, 2018; Yossef, 2021). This history is significant because it proves that today's opposition is not a given, is the result of certain ideological and systemic changes.

The present-day aspect of this triangle is getting a qualitatively dangerous look. The U.S. withdrawal from the JCPOA in 2018 has removed the main diplomatic tool limiting Iran's nuclear program, further applied coercive pressure, and reduced opportunities for de-escalation (Azad, 2023). The escalation cycles of 2024-2025, which featured direct missile exchanges, proxy confrontations and maritime tensions, have also indicated that the triangle is at a tipping point with less predictable deterrence and structural conflict spillover (Bagheri Dolatabadi, 2025; Popalzay et al., 2025).

This conflict has implications in three related areas. In economic terms, the uncertainties in the Strait of Hormuz, the Red Sea and Bab-el-Mandeb create impediments to global trade, increase trade insurance premiums and fuel the volatility of energy prices (Azad, 2023; Saraswat, 2024). Iran's move toward shadow trade and increased ties with China mirrors Russia's strategies for sanctions evasion and likely indicates a breakup in the current system of economic order (Bajoghli et al., 2024; Bazoobandi, 2024). Strategically, the conflict has accelerated Sunni-Arab-Israeli convergence while drawing in external powers including China, Russia, India through the Chabahar port, and Pakistan through its Belt and Road commitments. The combination of Iran's proxy networks, Israel's prevention doctrine and U.S. military empowerment are what create a “layered escalation architecture” that embeds regional conflict globally (Akbarzadeh & Naeni, 2025; Eisenstadt, 2025; Khan et al., 2025).

Perhaps rich but fragmented across disciplines, it has not yet been sufficiently taken up by the existing scholarship as a conflict system integrated across the three dimensions. This paper aims to answer three research questions based on the balance of power and balance of threats theories (Waltz, 1979; Walt, 1987): How has the conflict affected the regional and global power distributions? In what ways does it interfere with trade, energy markets and sanctions regimes? What are its implications for security, including in terms of proxy warfare and nuclear risk? This paper will address these questions, offering an integrated analysis of regional rivalry, economic coercion and security escalation as modalities that intersect to engender structural instability in the contemporary international system.

Literature Review

In the last 20 years, a lot of scholarship has been produced about the Israel-Iran-USA triangle, but it is analytically disjointed. Although there have been some good studies concerning the historical, strategic, economic, and security aspects of the conflict, the emphasis is seldom placed on these aspects as components of a whole geopolitical apparatus. The literature can be divided into four thematic strands: historical and strategic studies of Israel-Iran relations and U.S. involvement; sanctions and economic coercion and its literature; security literature on proxy warfare, deterrence, drones and nuclear risk; multipolarity, external actors and regional realignment. These three threads intertwine and offer a solid foundation, but they also reveal a major missing link — the lack of a holistic approach to the triangle that views it as a comprehensive conflict system with implications for regional stability, global commerce, and international governance (Kamrava, 2018; Bazoobandi, 2024; Popalzay et al., 2025).

Strand One: Historical and Strategic Foundations

The first strand focuses on a historical and ideological analysis of the triangle. One of the most important contributions of this literature is the challenge to the notion that Israeli-Iranian enmity is unchanging, or even inevitable. Despite this, Israel and Iran during the Pahlavi period continued to have a measure of strategic pragmatism along the lines of peripheral alignment logic as has been described by Parsi (2005), Menashri (2006) and Rodman (2013). The final tipping point was the 1979 Islamic Revolution, which made Israel and the U.S. two of the main targets of Iran's foreign policy stance (Buonomo, 2018; Ben Aharon, 2024). These cleavages have been further solidified by the regional reconfiguration that occurred after 1991 when the regional ambitions of Iran, America's alliance commitments, and Israel's threat perceptions have become

structurally incompatible (Yossef, 2021; Kamrava, 2018). The totality of this work already sets up the fact that the current set up is historically contingent and thus also analytically open to change, which is dictated by certain political developments. It is, however, in the main concerned with bilateral relations, and it does not engage systematically with the evolution of the triangle in terms of U.S. policy documents, military doctrines, and official state positions, a topic the current study hopes to rectify.

Strand Two: Sanctions, Economic Coercion, and Fragmented Interdependence

The second strand focuses on sanctions as tools of strategic coercion and on their wider economic impact. Newer scholarship on sanctions goes beyond the understanding of sanctions as a diplomatic instrument with short-term implications and instead considers them a means of altering state behavior, domestic political economies and international trade orientations (Bajoghli et al., 2024; Khoshnood, 2019). Importantly, this literature questions the implicit notion that economic pressure will lead to strategic moderation. The long-term effects of sanctions, as seen in the case of Iran, are likely to strengthen hard-liner rule, security-driven economic policies and institutional resilience against sanctions, not compliance (Abbasi, 2025; Rahimi & Rezaei, 2025; Sohrabi, 2018). In response, Iran has developed alternative economic arrangements, such as barter deals, shadow shipping, informal trade networks, and strengthened ties with non-Western actors, including China (Azad, 2023; Bazoobandi, 2024). Notably, this is not something unique to Iran. In fact, the extensive usage of the sanction evasion mechanisms since the Ukraine conflict in Russia is illustrative of Iran's adaptation mechanisms, which means there is a more general pattern of fragmented interdependence and de-dollarization (Grajewski, 2023) that the Israel-Iran-USA triangle is actively facilitating. The literature in this way relates the triangle to the more general issues of the decline of the western economic order, and this deserves more attention.

Strand Three: Security Dynamics — Deterrence, Proxy Warfare, and Nuclear Risk

The third strand looks at the triangle's security architecture. Iranian security strategy scholarship argues that Tehran's approach to conventional military weaknesses is to foster a forward-defense doctrine that relies on armed non-state networks, precision missile systems, drone operations, and geographically dispersed theatres of confrontation (Akbarzadeh & Naeni, 2025). In addition to being proxies, Hezbollah, Hamas, the Houthis, and allied groups in Iraq and Syria are also part of a distributed deterrence mechanism that enhances Iran's strategic depth and makes its potential response to any military attack an intricate affair (Saraswat, 2024; Şimşek, 2025). By contrast, Israeli security doctrine is based on preemption, intelligence supremacy, and precision strike capability that enables it to thwart threats before they become intolerable (Yossef, 2021; Eisenstadt, 2025). The U.S. is both a stabilizing force, providing military aid to help Israel maintain deterrence, and a destabilizing force because of its role in making Iran feel cornered in terms of its strategic interests (Bahgat & Ehteshami, 2017; Heiran-Nia, 2025). Analysts broadly concur that Iran's developing enrichment capabilities raise a destabilising atmosphere which makes the arguments for preventive military action more plausible. However, there is disagreement about their effectiveness; such strikes could set back Iran's capabilities, but could also harden the nuclear resolve of Tehran, setting an end to diplomacy and leading to a multi-theatre response (Eisenstadt, 2025; Bagheri Dolatabadi, 2025).

Strand Four: Multipolarity, External Actors, and Regional Realignment

The fourth strand places the triangle in the context of wider regional and global order change. As stated by Kamrava (2018), multipolarity, ideological polarization and fragility of the state in the Middle East are inherent to the region's instability. More recent works continue the argument by emphasizing the role of China, Russia, and key Gulf states (the UAE, Qatar and Saudi Arabia) whose views have a significant impact on the geopolitical environment of the triangle (Grajewski, 2023; Bazoobandi, 2024). China's involvement is mainly economic with its interests focused on energy trading transactions and sanction evasion, and Russia's involvement is more strategically and diplomatically oriented with overarching resistance to West. Significant too is the literature reference to the participation of neighboring regional actors: India's tenancy of the Iranian port of Chabahar is an indication of strategic interest in Iranian connectivity, while Pakistan's role, as both a potential mediator and a country tightly coupled with China's Belt and Road Initiative, introduces another dimension to the triangle's regional implications (Yitzhak, 2026). The Sunni-Israeli convergence has also been

illustrated by studies, which have showed that the Iranian threat has brought new formulae of coordination between Israel and the Arab States, thereby changing the political picture fundamentally in the region.

Identifying the Gap

The literature, at the same time, is both full and disjointed. While each strand offers a powerful light on one aspect of the triangle, none sees the triangle as a conflict system in and of itself. This paper examines how strategic, economic, and security dynamics conspire in the triangle to create cumulative instability, not only in the Middle East, but throughout the structure of the international system as it exists today, by adopting a balance of power and balance of threats perspective (Waltz, 1979; Walt, 1987).

Method

This paper uses a qualitative analytical research design which is based on a systematic review of current literature with some quantitative indicators. The goal is not to create a statistical model of the Israel-Iran-USA conflict, but to produce an integrated analytical account of the conflict's strategic, economic and security dimensions that catalyze the instability in the region and globally. The complexity and historical connections of this triangle require a qualitative analysis that can look at threat perceptions, ideological narratives, alliance behaviors, sanctions dynamics, proxy warfare and escalation patterns in a single analysis.

Theoretical Framework

The study has its theoretical foundations in two complementing theoretical perspectives in the paradigmatic tradition of the International Relations theory. The argument has a structural basis in the balance of power theory (Waltz, 1979) and is used to explain the formation of alliances, deterrence considerations, and competitive behavior as a function of the distribution of capabilities between Israel, Iran, and the United States. Incorporating perceptions of threat as geographic proximity, offensive capability, and aggressive intent makes this analysis more sophisticated as represented by the balance of threats theory (Walt, 1987), which uses these perceptions as independent variables. These frameworks, in combination, allow the paper to transcend the material capability and to consider the influence of ideology, strategic signaling or encirclement upon the dynamics of the triangle.

Analytical Design

Thematic and comparative approach of analysis is used in the study. It does not look at Israel, Iran and the United States as individual players, but rather as a “triadic geopolitical system” defined by historical antagonism, coercive diplomacy, proxy networks, nuclear ambiguity and changing great-power alignments. The analysis takes place in 3 stages.

First, thematic analysis highlights patterns throughout literature and these have been identified in three main dimensions which correspond to the three structural aspects of the paper: geopolitical rivalry, economic disruption and security escalation. Some of the sub-themes are alliance building, sanctions resistance, maritime choke points, multi-polar competition, nuclear proliferation, and proxy warfare.

Second, discourse-oriented interpretation focuses on the ways in which threat, legitimacy and strategic necessity are represented by key actors by way of official state documents, policy statements, military doctrines and political rhetoric. This is analytically necessary – perceptions and ideological narratives are as influential as material capacities in determining conflict behavior. The analysis is based, where appropriate, on primary sources such as U.S. Treasury designations of sanctions, International Atomic Energy Agency (IAEA) reports on Tehran's nuclear program, and official correspondence between Israel and Iran, not just on secondary interpretations thereof.

Third, there is longitudinal comparison of structural changes in the triangle over three important junctures: the strategic pragmatic period prior to 1979, the post-JCPOA period of maximum pressure from 2018 onward and the direct confrontation cycle of 2024-2025.

Role of Quantitative Indicators

The study is rather a qualitative study but with quantitative indicators used in a contextualizing manner. They include oil price volatility data on the escalation periods, shipping disruption data at Red Sea and Strait of Hormuz, trade exposure metrics and documented military expenditure trends. These indicators do not undergo formal statistical testing, but support the conclusion that conflict has real-world implications, and measurable ones, that go far beyond the battle itself.

Limitations

The study does not address classified intelligence or diplomatic correspondence but is made up of documents that are available to the public. In view of the fluid situation of the war, some events may be subject to further analysis. However, the method is appropriate for the central focus of the study: a regional conflict system and a structural instability mechanism in the modern global order, the Israel-Iran-USA triangle.

Geopolitical Impacts of the Israel-Iran-USA Conflict

Strategic Alliances and Rivalries: Reconfiguring Regional Power

The Israel-Iran-USA triangle is today the most structurally significant geopolitical fault line in the modern Middle East. It is not just because there are three strong players who are at odds with each other, but because this antagonism is constantly reinventing regional balances, evolving patterns of threats and turning local issues into systemic threats to deterrence and international order. Historically, it was handled in the shadows with “diplomatic signaling” and “proxy confrontation” but has increasingly erupted in an open military confrontation. The 2024-2025 escalation cycle of direct missile attacks, assassinations and multi-theatre proxy escalation proved that this triangle could no longer be considered a manageable regional confrontation. It has now expanded to a more comprehensive geopolitical framework that has tangible impacts on the behavior of allies, the credibility of deterrence, and regional stability (Bagheri Dolatabadi, 2025; Popalzay et al., 2025).

The threat logic for each actor is unique, and there is no way to structurally make de-escalation easier. Israel sees Iran as a "systemic existential threat," due to its nuclear ambitions, long-range missile potential, and its network of armed non-state allies on Israel's borders. For Iran, on the other hand, the U.S.-Israeli relationship is, indeed, an “architecture of encirclement,” aiming to contain Iranian influence in the region, and to limit its strategic autonomy. The United States, paradoxically, has created an escalating security dilemma this way, both by virtue of its military aid to Israel and the magnification of Iranian threat perceptions as well as by its maximum pressure policy reducing the room for diplomatic resolution (Ahmed et al., 2024; Heiran-Nia, 2025; Eisenstadt, 2025).

Regional Political Reordering: The Fragmentation of the Middle East

The triangle has driven a faster reconfiguration and polarization of the Middle East region. The war has intensified ideologies, sectarianism, and strategic rivalries in Lebanon, Syria, Iraq, Yemen, Gaza, and the Gulf. Iran's forward-defense doctrine, which involves arming, training and directing non-state actors in various fronts, has greatly expanded Tehran's strategic footprint and has engendered insecurity among U.S.-aligned Arab states, which has prompted various types of selective alignment, strategic hedging and transactional cooperation.

The biggest realignment took place when Israel and some of the important Sunni Arab countries began to eye each other with mutual interest, with Iran's expanding influence in the region serving as a common interest. The UAE and Bahrain's normalization deal with Israel under the Abraham Accords, Saudi Arabia's considered, but substantive, security agreement and Qatar's ambivalent-to-mediating role as a hedge actor all exemplify how the threat of Iran has reshaped Arab political calculations (Yitzhak, 2026). Jordan's current mediator status also exemplifies how middle powers are starting to take more initiative in a new multipolar regional landscape. This realignment has had its price: Palestinian issues have steadily been pushed to the fringes of Arab strategic thinking, put in the service of balancing anti-Iranian policies. At the same time, fragile states such as Lebanon, Syria, Iraq, and Yemen have turned into the permanent theatre of geopolitical

contention that is marked by the fight of hybrid warfare, the erosion of institutions, and chronic instability (Popalzay et al., 2025).

The United States and the Limits of External Balancing

The United States continues to be the most powerful external player in that of the triangle, but it has its own inherent paradoxes as a stabilizing force and destabilizing factor. Washington's full package of assistance to Israel, including arms, intelligence, diplomatic protection and strategic reassurance, maintains Israeli military superiority, and is essential to regional deterrence. Meanwhile, U.S. policy since the withdrawal from the 2018 JCPOA has concomitantly shut diplomatic doors, intensified Iran's strategic stance, and intensified Tehran's embrace of asymmetric arms and non-Western alliances (Heiran-Nia, 2025).

This paradox is epitomized in the maximum pressure campaign since 2018. While it was intended to drive Iran's economy into a corner and force strategic concessions, it instead strengthened the political position of the hard-liners of Iran, encouraged more cooperation with China and Russia and it increased the scope of Iran's proxy network. The 2024-2025 direct confrontation cycle clearly and definitively proved that direct military exchanges do not guarantee "controlled escalation" with the leverage of the American influence. But here power is not primarily an ordering force, it is a structural accelerant, making a war it can't completely manage more intensely.

From Regional Rivalry to Global Geopolitical Competition

The triangle has now become an indelible part of the global power balance transformation. At the same time, China and Russia have tightened their strategic ties with Iran, in the face of increasing tensions with the West. The main role of China is economic, focusing on energy trade, sanctions circumvention, and financial connectivity; the main role of Russia is strategically and diplomatically oriented, united by a common interest in contesting the security architecture led by the West (Grajewski, 2023; Bazoobandi, 2024). In addition to these great powers, regional players have also become involved in triangles. They are driven by India's strategic interest in bypassing Pakistan and gaining access to markets in Central Asia, and Pakistan's strong involvement in China's Belt and Road Initiative as a significant, albeit little-known, player in the geopolitical game of the three-way triangle (Yitzhak, 2026). Thus, the war has ceased to be a regional affair between the Middle East, but rather an active battlefield in the politics of global political, economic and security building.

Geopolitical Implications for Regional and Global Stability

The general geopolitical message is quite clear: the Israel-Iran-USA triangle no longer exists as a manageable regional conflict, but as a structural source of global instabilities. The shift from indirect proxy confrontation to direct engagement, as was attempted in June 2025, has seriously undermined the premise that such conflicts in the triangle would be amenable to indirect measures. Now, the triangle does not yield episodes of crisis, but persistent structural insecurity, which has ripple effects on the cohesion of alliances, maritime security, energy market stability and the direction of multipolar great-power competition. The triangle is a fundamental driving force in any serious analytical discussion of the future of international order.

Economic Effects of the Israel-Iran-USA Conflict

Trade Routes, Maritime Vulnerability, and the Globalization of Regional Risk

The economic aspects of the Israel-Iran-USA conflict are in its potential to escalate the military threat from the region to become a systemic threat to the global economy. It has repercussions beyond just the domestic economies of the three key players, impacting maritime trade routes, global energy markets, insurance prices, sanctions frameworks, investor confidence, and international supply chain figures. War takes place in a space between the economic and the security, with the decisions made in both domains, from uncertainty in the market to military signaling and coercive diplomacy, coming to reinforce each other in a self-propelling spiral of instability.

Three key maritime choke points are at the heart of this vulnerability: the Strait of Hormuz, the Red Sea, and the Bab-el-Mandeb. Together these waterways handle around a third of the international shipping of oil and large amounts of container shipping. In 2024 alone, commercial vessels have been targeted with

Houthi missile and drone attacks, impacting major shipping lines in the Red Sea, which have been rerouting around the Cape of Good Hope, with shipping times estimated to increase by 10-14 days and freight costs by more than 200 percent on some Asia to Europe shipping routes (Saraswat, 2024). Most importantly, the conflict does not have to take place for these routes to have an economic impact: the mere threat that they might escalate is enough to change the dynamics of the market, raise the price of war risk insurance and increase constant uncertainty in the global trade environment (Bagheri Dolatabadi, 2025; Popalzay et al., 2025).

Sanctions, Economic Coercion, and Fragmented Interdependence

After U.S. withdrawal from the JCPOA in 2018 and comprehensive sanctions were reestablished, economic coercion has been serving as a long-term strategic attrition mechanism in addition to a diplomatic tool. U.S. Treasury sanctions designations have increasingly cut off Iran's ability to use formal international banking, dollar-denominated trading and access to western capital markets, forcing Tehran to invest in parallel economic infrastructure through informal trade, shadow shipping fleets, barter and transactions using cryptocurrency (Azad, 2023; Bazoobandi, 2024).

The central paradox of this strategy is well-documented: sanctions have caused severe humanitarian and macroeconomic damages to Iranian society: Iran's rial has lost more than 60 per cent of its value since 2018; the inflation rate soared to above 40 per cent; and poverty rates have increased significantly (Abbasi, 2025; Rahimi and Rezaei 2025). However, the continuation of economic pressure has left hard-line political narratives intact, further securitized Iran's economic governance, and hastened its institutional coping with external pressure. Key, Iran's actions mirror the ones taken by Russia in the wake of the 2022 sanctions and both examples display a common dynamic: sanctions facilitate the pullout of sanctioned countries from the mainstream of the Western-led economic order, and push them into other circuits of trade, finance and strategic affiliation — thereby sowing the very seeds of the fragmentation that sanctions aim to prevent (Grajewski, 2023).

Energy Markets and the Political Economy of Escalation

The triangle exerts influence on global energy markets through both material disruption and psychological pressure. Geopolitical risk from the war manifests as oil price volatility: the risk that infrastructure will be targeted, that transit will be interrupted, that a regional war will escalate. The direct war between Iran and Israel in June 2025 resulted in the immediate increase of the Brent crude price by 12% due to the vulnerability of the Strait of Hormuz and Iran's export continuity (Bagheri Dolatabadi, 2025). Even if there is no actual disruption, the conflict helps to maintain a structural risk premium in energy prices, that is, a permanent tax on the global economy caused by geopolitical turmoil.

The fact that Iran has been able to continue exporting a respectable amount of oil in 2024, with an estimated 1.5 million bpd sold mainly to China via a series of shadow tanker sales, further demonstrates how sanctions have created a more fractured global oil market (Bazoobandi, 2024). This bifurcation undermines the repressive force of sanctions and establishes alternative energy pricing mechanisms which over time will corrode the unity of economic pressures organized by the west.

Asymmetric Economic Resilience

The conflict is a burden both for Iran and Israel, with fundamental differences between the two countries' economic resilience mechanisms. Iran's chance for economic survival is based on import substitution, orientation toward the domestic market, state-guided resource allocation and extensive diversification of non-Western trade. High-tech, strong institutions, close ties to the international innovation system and strong external security support are some of the determinants of Israel's resilience. But there are escalating long-term costs for both. The real issue for Iran is not if sanctions inflict economic harm, which they clearly do, but if that harm forces strategic concessions. There is always evidence that indicates it does not. For a technologically sophisticated and globally integrated Israeli economy, the cumulative costs of ongoing conflict are considerable, as a result of increased military spending, reduced foreign direct investment, and systematic diversion of human and financial resources into security issues.

De-Dollarization, External Realignment, and the Restructuring of Global Economic Order

A structural challenge to the dollar-denominated international economic order is the continued growth of Iran (and now Russia) into a non-Western financial and trading system. The growing trend of Iran-China bilateral trade to be paid in the yuan and other payment channels is not a sign of commercial preference but rather strategic maneuvering as a result of decades of Western economic embargoes (Grajewski, 2023; Bazoobandi, 2024). The more sanctions take hold as a pillar of U.S. foreign policy, the stronger becomes the impetus for non-Western suppliers to build a more self-reliant financial system that is not dollar dependent. The Israel-Iran-USA triangle is thus far from being just a regional battle with side effects on the economy — it is an active force driving de-dollarization and the disintegration of the liberal economic order that emerged after the Second World War.

Future Economic Pathways

The long-term economic impacts of the triangle will depend more on whether the war is turned into a risk structure that cannot be turned off, than on immediate market fluctuations. If the direct confrontation continues or escalates – which is likely – the consequences will not be a fleeting spoiling of the control environment, but rather a continued increase in risk premiums in trade, energy, in shipping and in the region in general for the foreseeable future. However, in order to ensure economic stabilization as a means to sustainable development, a holistic approach to confronting military escalation must be complemented by an action plan to overcome the structural impediments to economic development – the architecture of sanctions, financial exclusion, energy politicization and maritime insecurity. In the absence of such a comprehensive approach the temporary restraint will be inadequate to break the economic base of chronic instability.

Security Impacts of the Israel-Iran-USA Conflict

Security Competition, Deterrence Failure, and the Escalation of Regional Conflict

What we are seeing in the security dynamics of the Israel-Iran-USA triangle is qualitatively different from the days of "managed indirect confrontation. This new phase is not only characterized by increased tensions, but also by the erosion of the structural predictability of deterrence that the situation in the region has evolved on to date. What we see is that in today's triangle, conventional asymmetry, proxy warfare, great-power involvement and advanced missile and drone capabilities, and nuclear ambiguity are all woven together in a single-conflict architecture. It is a system of security that makes escalation too possible, and where all the elements that are usually used to make escalation less likely—credible deterrence, clear red lines, and effective crisis communication—have been eroded over time.

This shift was clearly evident during the 2024-2025 escalation cycle. The flashpoints of Gaza, southern Lebanon, Syria, Iraq, the Red Sea and Iranian nuclear facilities can no longer be seen as isolated theaters of war. They are kind of nodes in a networked escalation architecture, where actions in one domain trigger calculated or miscalculated reactions in other domains (Bagheri Dolatabadi, 2025; Popalzay et al., 2025). This connectedness significantly increases the chances of miscalculation, strains crisis management capacities and makes a controlled signaling paradigm at the heart of classical deterrence theory increasingly uncertain.

Military Doctrines and the Logic of Strategic Asymmetry

The three actors are guided by essentially incompatible security logics, and it is here that lies the difficulty of stabilizing the triangle. Preemption, air defense dominance, precision strike capability and layered air defense are the cornerstones of Israel's military doctrine. Israeli security policy is, by nature, anticipatory, based on the premise of the Begin Doctrine, which holds that Israel would not allow a hostile state to get close to acquiring weapons of mass destruction (Yossef, 2021; Eisenstadt, 2025). The doctrine was most evident in the way Israel conducted in a series of operations against Hezbollah's weapons infrastructure in Lebanon, and the 2024 strikes against Iranian territory.

The United States serves as an offshore balancer, strategic enabler and final guarantor of Israel's military superiority. Advanced weapons transfers (such as providing GBU-57 bunker-buster munitions and THAAD missile defense systems), intelligence sharing, forward force projection, and diplomatic support in multilateral fora are all part of Washington's reinforcement of Israeli deterrence. However, this assistance also

has a strategic contradiction: it may be intended to deter regional escalation, but it also gives Tehran the sense of being surrounded and adds to its security dilemma and may paradoxically lead to escalation (Bahgat & Ehteshami, 2017; Heiran-Nia, 2025).

It is a matter of distributed deterrence that Iran assumes as a security logic. Confronted by Israel and the United States, Tehran is incapable of competing in conventional military power and has adopted an asymmetric strategy with the intention of forcing adversaries considering a direct confrontation to pay a price they will not be able to afford. The three pillars of this posture are: Iran's precision missile force, deployed on various bases across the Middle East, Indigenous drone warfare capability that has been combat-tested in multiple theaters, Armed non-state allies that spread Iran's retaliatory reach from the Mediterranean to the Arabian Sea (Akbarzadeh & Naeni, 2025; Şimşek, 2025). It is not a winning architecture; it is one that makes a conventional war so expensive that it is not worth fighting.

Proxy Warfare and the Regionalization of Insecurity

The most durable and impactful security arm of the triangle is Iran's proxy network, and that includes Hezbollah in Lebanon, Hamas in Gaza, the Houthis in Yemen and the associated armed groups in Iraq and Syria. These actors give Tehran the opportunity to externalize confrontation, achieve plausible deniability and to play the strategic game at lower risk levels. But the war by proxy has repercussions that go beyond the Iranian strategic equation. It undermines state sovereignty in weak host states, weakens institutional unity, and expands the number of actors that can escalate violence without the formal consent of the state (Saraswat, 2024; Şimşek, 2025).

The Red Sea crisis is a case in point. The Houthi banner of solidarity with Gaza quickly turned into a significant disruption of global maritime trade that had to be met with multinational naval force deployments and resulted in over 2,000 vessel diversions around the Cape of Good Hope. What this episode illustrates is that proxy actors inserted in the conflict structure of the triangle can have global-scale Security/Economic consequences which are by-products of the desire of their state sponsors.

Nuclear Risk and the Politics of Preventive Action

The worst long-term security threat looming in the triangle is the nuclear aspect. With uranium now enriched to 60 percent purity and stockpiles that in 2024 were deemed by the IAEA to be "enough" for multiple nuclear devices if enriched further, Iran's growing enrichment program has turned nuclear latency into a major factor that undermines regional security calculations. What matters is not whether Iran has reached the threshold to develop weapons but whether it is clearly believed to be doing so, which would, according to Eisenstadt (2025) and Heiran-Nia (2025), justify a preemptive military strike.

Logically, it is an imperative for Israel: to prevent. Operationally, it is dangerous. Preventive strikes are likely to short-term damage the nuclear capabilities of Iran but the June 2025 escalation proved that any military action of significance against Iran's nuclear infrastructure would be answered with immediate response at multiple-levels – missile barrages, proxy activation and maritime confrontation – that soon escalates beyond the scope of the initial strike (Bagheri Dolatabadi, 2025). The nuclear problem is therefore a security dilemma because if it is not acted upon, there is a risk of Iran weaponizing, but if there is action, there is a risk of an uncontrollable regional war.

The Internationalization of the Security Crisis

The war has increasingly extricated itself from the security dynamics of Middle East and became an integral part of the great power rivalry system. The UN Security Council's historical inability to come up with binding resolutions to manage crises, due to Russian and Chinese vetoes, has removed the main multilateral system of de-escalation. Both Russia and China have used Iran's strategic isolation to serve their own ends: Russia by selling arms and providing diplomatic protection, and China by selling energy and providing financial cooperation (Grajewski, 2023; Bazoobandi, 2024). The outcome is a conflict which is both regionally immediate and structurally extricating for the major powers; one in which the major powers are players, not referees.

Alliance Structures and the Emerging Security Order

The triangle is surrounded by a security order which has been shaped by the struggle of two fundamentally conflicting alliance models. There is the U.S.-Israel axis, which provides technological superiority, diplomatic legitimacy and institutional coordination through formal and semi-formal security commitments made to key Gulf partners, such as Saudi Arabia and the UAE. Signed alliances and outside support, all armed, but less tightly organized and operationally flexible, offer flexibility, distributed risk, and strategic reach for Iran. Precisely, the triangle has proven to be resistant to stabilization, with the incompleteness between these two models, deterrence and alliance management, on the one hand, and asymmetric pressure and denial, on the other, the underlying explanation. But it is not a security order based on equilibrium, it is a system of layered confrontations whose escalation management is permanently disputed and whose crisis resolution is structurally lacking.

Conclusion

The Israel-Iran-USA triangle has become one of the more structurally significant geopolitical configurations in the international system today. As this paper has illustrated its significance is not just in terms of the intensity of local aggression, but in the interaction between strategic competition, economic coercion, and compounding security dilemmas, and the resultant self-reinforcing architecture of instability an effect that now radiates well beyond the geographical confines of the Middle East into the realities of global trade, energy security, deterrence politics, and multipolar realignment.

Geopolitically, the triangle has fundamentally broken-down older notions of the manageability of indirect conflict. All three, Israel's preemption doctrine, Iran's distributed deterrence and the U.S. as an external balancer, have helped drive polarization in the region. The slow but steady confluence between Israel and the Sunni Arab states, the UAE, Saudi Arabia and Qatar—is testament to the extent of the Iranian threat's reshaping of Middle Eastern political realignments. The addition of India via Chabahar and Pakistan with Belt and Road signal yet further the geopolitical scope of the triangle now encompasses South Asian space, setting the conflict in the context of the Eurasian connectivity and influence game.

The economic impact of the war is not episodic, but accumulative. Sanctions pressure has led to no strategic moderation on the part of Iran and has fostered more and more entangled interdependence, de-dollarization, and the establishment of alternative economic cycles involving Iran, Russia, and China. The persistent maritime insecurity in the Strait of Hormuz, the Red Sea and Bab-el-Mandeb have become embedded in global trade, energy and shipping markets in the form of a structural risk premium. These aren't just transitory warps; they're lasting changes in the structure of the global economic system that require prompt policy responses.

Proxy confrontation and direct military exchange are no longer distinct categories, a conclusion as clear as it gets in security terms, in view of the 2024–2025 escalation cycle. Existing diplomatic constraints have been completely unable to manage a destabilizing dimension brought by nuclear ambiguity, Iran's ongoing process of enrichment, which as assessed by the IAEA in 2024 is getting close to levels needed to make weapons, and the logic of preventive action. The message is clear: it is no longer a regional issue but has external implications: Israel-Iran-USA. It is a regional-global conflict system where geopolitical polarization, economic destabilization and security escalation are structurally connected

Policy Recommendations

This analysis leads to four policy imperatives. Diplomatic reengagement with Iran needs to be rethought as a structural requirement because without a structure, as the JCPOA proved, Iranian nuclear ambitions accelerate, not slow down. Secondly, there needs to be more multilateral coordination, with non-Western actors, to establish maritime security governance at critical chokepoints, so as not to make disruption of commerce permanent. Third, sanctions architecture needs to be thoroughly reconsidered – the evidence has been gathering that coercion in the absence of a credible diplomatic process leads to adaptation not to moderation. Fourth, regional security arrangements need to progress from a bilateral nature to inclusive ones, where the security concerns of all major stakeholders including Iran are considered legitimate.

Future Research Directions

However, this paper provides numerous possibilities for future research. Researchers need to look at the consequences of sanctions-induced de-dollarization in the long run for the dollar's role as a reserve currency. More research should be conducted on the Iran-Russia-China strategic convergence and its possible formation into a bloc against the West. The involvement of Pakistan, India, Turkey and the Gulf nations in defining the trajectory of the triangle can be treated at a separate analysis. Lastly, the use of formal deterrence theory in efforts to analyze such multi-actor, asymmetric conflict systems is a key area for theory and policy focused research.

The Israel-Iran-USA triangle will continue to be one of the major fault lines of the twenty first century. The way in which it is managed will define the region's security, the global economic stability and the new multipolar world order for decades to come.

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Emotional Labor and Mental Health Problems in Working Individuals with Chronic Nonspecific Musculoskeletal Pain: Role of Psychosocial Reactions, Burnout and Relationship Quality

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Working individuals with chronic nonspecific musculoskeletal pain (CNMP) usually face sustained occupational demands that tend to intensify psychological risks. Emotional labor is a key stressor for working individuals but its role to mental health problems is still insufficiently understood. This study examined a moderated serial mediation model which tested whether psychosocial and emotional reactions to pain and burnout mediate the relationship of emotional labor and mental health problems where quality of relationship act as a moderator. Cross-sectional correlational research design was used to extract data from 210 working adults (Male=72, Female=138; $M_{age}=32.30$, $SD_{age}=7.34$) with CNMP using standardized self-report measures. Correlation analysis provided preliminary support for the proposed model by indicating meaningful associations among emotional labor, psychosocial reactions, burnout, relationship quality and mental health outcomes. Hayes' PROCESS Model 88 with 5,000 bootstrap samples indicated that emotional labor was positively correlated with psychosocial and emotional reactions which in turn predicted mental health problems but this indirect effect was weakened at higher levels of relationship quality. Burnout did not significantly mediate the association while the direct effect of emotional labor remained significant. This research concludes that psychosocial and emotional reactions to chronic pain are a central mechanism linking emotional labor to mental health problems where quality relationships serve a protective role.

Keywords: emotional labor, chronic musculoskeletal pain, mental health, psychosocial and emotional reaction, burnout, quality of relationship, working individuals, Pakistan

Chronic musculoskeletal pain is among the most prevalent causes of disability and poor quality of life across the globe, particularly among working individuals (Alhashim et al., 2025). Among these conditions, chronic nonspecific musculoskeletal pain (CNMP) refers to persistent musculoskeletal pain lasting longer than three months without a clearly identifiable pathological cause (O'Sullivan et al., 2011). In CNMP neck, back, shoulders and limbs are commonly effected and are associated with functional limitations, fatigue, reduced work productivity and psychological distress (Durán et al., 2021; Dzakpasu et al., 2021; Zhou et al., 2024). Chronic pain cannot be fully understood solely through biomedical mechanisms because it involves a complex interplay between physical symptoms, psychological responses and social contexts of the individuals (Gatchel et al., 2019). Research has constantly demonstrated that physical and mental health are closely interconnected as deteriorating physical health contribute to psychological distress and poor mental health further exacerbate physical health consequences (Luo et al., 2020; Ohrnberger et al., 2017). Consequently, individuals living with CNMP often face multiple challenges in maintaining physical functioning and psychological well-being within demanding occupational environments.

Despite experiencing persistent pain, many individuals with CNMP continue to remain active in the workforce and must manage both physical discomfort and occupational demands. One occupational demand increasingly recognized as a reason of psychological strain is emotional labor, which refers to the regulation of emotional expressions to fulfill organizational requirements during interpersonal interactions (Hochschild, 1983). Emotional labor requires personnel to suppress or alter their genuine emotional reactions in order to exhibit emotions that are socially or professionally appropriate. While emotional labor is common across service-oriented and professional roles, sustained emotional regulation has been associated with psychological strain, emotional exhaustion and adverse mental health outcomes (Jeung et al., 2018). Research has shown that emotional labor is positively related with emotional exhaustion and poorer physical and mental health outcomes among healthcare professionals and other service workers (Chen et al., 2022).

The psychological impact of emotional labor may be particularly pronounced among workers experiencing chronic pain as individuals with CNMP frequently report heightened emotional reactivity, frustration and pain-related distress, which may make emotional regulation during workplace interactions more challenging (Pérez-Martín et al., 2025). Managing persistent pain while simultaneously fulfilling emotional display requirements may place additional cognitive and emotional demands on individuals, thereby increasing vulnerability to stress and psychological difficulties (Kim & Choo, 2017; Suh & Punnett, 2022). Research has further demonstrated that emotional strains and surface acting are strongly linked with burnout and poor mental well-being across service professions, highlighting emotional demands as significant occupational risk factors for psychological distress (Popucza et al., 2025). Similarly, emotional labor has been linked to occupational burnout, which in turn predicts adverse work-related and psychological outcomes (Lv et al., 2025).

Present study is grounded in the Job Demands–Resources Theory (Bakker et al., 2023) supporting that work demands require sustained effort which lead to stress and health impairments in the absence of adequate resources. Emotional labor represents a key job demand because it requires employees to regulate emotional expressions continuously in social interactions. According to this model the effect of job-demands on health outcomes is transmitted through intermediate psychological responses that reflect reactions to stressors by the individuals. The study also draws on Conservation of Resources Theory (Hobfoll, 2011) which suggests that people strive to obtain, remember and guard valued personal and social resources including emotional energy, physical health and supportive relationships. Tension occurs when these capitals are challenged or depleted. For individuals living with CNMP, chronic pain itself may already reduce available physical and psychological resources. Consequently, the additional emotional demands associated with emotional labor may accelerate resource depletion, increasing susceptibility to psychological strain and mental health problems.

Within these theoretical frameworks, psychosocial and emotional reactions to pain represent a key mechanism through which emotional labor may influence mental health outcomes. Chronic pain seems to evoke emotional responses such as frustration, worry, helplessness and perceived loss of control, which may intensify when individuals face demanding interpersonal interactions at work. Stress–strain perspectives within occupational stress research suggest that such emotional reactions represent immediate responses to stressors and may contribute to subsequent psychological difficulties (Seidler et al., 2022; Pérez-Martín et al., 2025). These reactions may be particularly salient for individuals with chronic pain, as pain-related emotional responses often fluctuate in response to workplace stressors and interpersonal demands (Goubert & Bernardes, 2025; Wainwright et al., 2022).

In addition to these immediate emotional responses, prolonged exposure to occupational stressors may contribute to burnout, a psychological condition of emotional fatigue, depersonalization and poor personal achievement (Demerouti, 2024; Nadon et al., 2022; Sim et al., 2023). Burnout is widely understood as a long-term effect of sustained occupational stress and has been repeatedly linked to emotional labor across various occupational settings (Amellah et al., 2025; Che Mat et al., 2025). However, it remains unclear whether burnout represents the primary mechanism connecting emotional labor to mental health problems among individuals with CNMP or whether more immediate pain-related emotional reactions play a more prominent role. It is important to address this distinction to refine theoretical models and identify effective intervention targets for individuals managing chronic pain in occupational settings.

Importantly, occupational stress processes do not arise in isolation but are formed by interpersonal and contextual resources of the individuals (Dipboye, 2018). Quality of relations in terms of perceived emotional support, understanding and responsiveness from coworkers, family members and significant others represents a key protective factor in stress processes (Huo et al., 2025; Oliveros et al., 2022; Valenti et al., 2021). Supportive relationships mitigate stress reactivity, promote adaptive coping and protect psychological well-being among working populations and individuals living with chronic pain (Jolly et al., 2021; Liu et al., 2023; Brown, 2024). Within the framework of Conservation of Resources theory, supportive relationships represent valuable social resources that can buffer the effects of resource depletion (Hobfoll, 2011). For the individuals with CNMP high-quality relationships reduce the psychological impact of pain-related emotional reactions by fostering emotional validation, shared coping and a sense of support (Martinez-Calderon et al., 2022). However, limited empirical research examined the moderating role of relational resources within conditional process models involving emotional labor and chronic pain.

To address these gaps, this study examined a moderated serial mediation model among working individuals with chronic nonspecific musculoskeletal pain (CNMP). Specifically, emotional labor is hypothesized to influence mental health problems both directly and indirectly through psychosocial and emotional reactions to pain and burnout. In addition, the study investigated whether quality of relations moderates the effects of these mediating processes on mental health outcomes. By integrating occupational stress theories with perspectives from chronic pain and relational research, this study aimed to advance understanding of how workplace emotional demands contribute to psychological vulnerability among individuals living with CNMP.

This study aims to (a) examine the direct association of emotional labor and mental health problems in working individuals with CNMP, (b) test the mediating roles of psychosocial and emotional reactions to pain and burnout and (c) investigate whether quality of relations moderates these mediation pathways.

Method

Participants

In this study a correlational research design was used. Purposive sampling technique was used to collect information from 210 working individuals (Male=72, Female=138) from age range of 25 to 50 years ($M=32.30$, $SD=7.34$) experiencing chronic nonspecific musculoskeletal pain (CNMP) from clinical/hospital, workplace and online settings. The participants were full time working individuals with minimum 16 years of education and serving desk jobs for more than 1 year. The sample size of 210 fell within the recommended range for multivariate and conditional process analyses (Green, 1991; Harris, 2001; Memon et al., 2020). CNMP was defined as persisting musculoskeletal pain without a specific identifiable medical pathology for more than three months. Those working individuals who possessed sufficient language proficiency in English or Urdu and were experiencing CNMP without any specific medical condition (e.g., fracture, inflammatory or neurological disorders), were currently employed or had no history of severe psychiatric or neurological illness were recruited in the sample. Eligibility was assessed using screening questions embedded at the beginning of the survey questionnaire for both online and in-person participants. In order to limit multiple representation by single participant, the option of one-time participation was activated in the google form. In addition to self-report screening, a substantial proportion of participants were recruited via referrals from general physicians, orthopedic specialists and physiotherapists which increased confidence in the appropriateness of CNMP classification despite the absence of formal medical record verification.

Measures

Prior to the data collection, all measures to be used in this study were reviewed by the research team and tested on a small sample in pilot phase to ensure the conceptual relevance, linguistic clarity and cultural appropriateness for the use with working individuals experiencing chronic pain.

Demographic and clinical information form

This form was used to access age, gender, marital status, education, nature of job, job tenure, pain duration, pain severity, pain location, cause of pain and history of medical assessment in order to confirm relevance of sample in accordance to the inclusion and exclusion criterion.

CNMP screening checklist

A screening checklist developed based on the literature and validated by the health professionals was used to identify the individuals with CNMP before recruiting to participate in research.

Dutch questionnaire on emotional labor (D-QEL; Briët et al., 2005)

This scale was used to measure emotional labor through emotional consonance, deep acting, suppression and surface acting. The scale comprised of 13 items to be rated on a 5-point Likert scale ($1=never$ to $5=always$) and higher scores indicated more emotional labor demands. In the current study, D-QEL demonstrated acceptable internal consistency (Cronh's $\alpha=.92$).

Psychosocial and emotional reactions scale (PSERS; Zafar et al., unpublished doctoral work)

This scale was used to measure psychosocial and emotional reactions to chronic nonspecific musculoskeletal pain (CNMP) in terms of helplessness, social strain, emotional strain and physical strain. This scale consisted of 38 items to be rated on a 4-point Likert scale ($1=never$ to $4=always$) and higher scores reflect stronger reactions in response to CNMP. The scale demonstrated satisfactory internal consistency in the present sample (Cronh's $\alpha=.98$).

Oldenburg Burnout Inventory (OLBI; Demerouti & Nachreiner, 1998)

The 16-item scale was used to measure burnout through two subscales of exhaustion and disengagement using a 4-point Likert scale (*strongly agree* to *strongly disagree*), with higher scores indicating greater burnout. OLBI demonstrated satisfactory internal consistency in the present sample (Cronh's $\alpha=.84$).

Relationship Assessment Scale (RAS; Hendrick, 1988)

This scale was used to access quality of relations through 7 items rated on a 5-point Likert scale ($1=low$ satisfaction to $5=high$ satisfaction), with higher scores reflecting better perceived relationship quality. RAS demonstrated satisfactory internal consistency in the present sample (Cronh's $\alpha=.88$).

Depression Anxiety Stress Scales–21 (DASS-21; Lovibond & Lovibond, 1995)

This 21 items scale was used to measure mental health problems in the participants using a 4-point Likert scale ($0=did$ not apply to me at all to $3=applied$ to me very much or most of the time) and a total score was used to index overall mental health problems in terms of depression, anxiety and stress. DASS-21 demonstrated satisfactory internal consistency in the present sample (Cronh's $\alpha=.92$).

Procedure

Ethical approval was obtained from the Institutional Review Board of the parent institute prior to data collection and it was also verified after the completion of the research that all the ethical standards were followed during the process of data collection, analysis and reporting. To approach participants, formal permissions were secured from clinics and workplaces before recruitment. Participants were recruited through outpatient clinics, workplaces and online platforms, using referral-based and self-selection approaches. Advertisement flyers comprising detailed description of the study and a QR code of online survey were presented in the waiting areas of clinics, workplaces and public locations to enhance accessibility and geographic diversity in the sample. After receiving detailed information about the purpose of the study, information about voluntary nature of participation, confidentiality, right to withdraw and estimated completion time of 25-30 minutes, the participants electronically provided their consent to participate in the research process. Data was collected using self-report questionnaires administered and recorded using online survey form. A screening checklist to screen CNMP from other musculoskeletal conditions was embedded in the questionnaire. Those who did not match the inclusion criterion were not allowed to proceed to the main questionnaire for data collection. To protect the mental health of the participants, information about mental health services, including contact details for local counseling centers and helplines, was provided at the end of the survey form.

Results

Table 1

Means, Standard Deviations and Pearson Correlations Among Emotional Labor, Mental Health Problems, Psychosocial and Emotional Reactions, Burnout and Quality of Relations (N=210)

Variable	EL	MHP	PSER	BO	QR
EL	—				
MHP	.35***	—			
PSER	.17*	.62***	—		
BO	.10	.34***	.32***	—	
QR	.15*	-.22**	-.20**	-.30***	—
<i>M</i>	33.51	22.90	55.73	34.33	18.98
<i>SD</i>	11.48	15.16	32.66	7.42	7.15

Note. EL=Emotional Labor, MHP=Mental Health Problems, PSER=Psychosocial and Emotional Reactions, BO=Burnout, QR=Quality of Relations; M=Mean, SD=Standard Deviation

* $p < .05$, ** $p < .01$, *** $p < .001$

Pearson correlation was used to examine associations among emotional labor, psychosocial reactions, burnout, relationship quality and mental health problems in working individuals with chronic musculoskeletal pain ($N = 210$). Results shown in Table 1 indicate that emotional labor has a moderate positive association with mental health problems and a small but significant association with psychosocial reactions. Emotional labor was also positively related to perceived relationship quality, while its association with overall burnout was not statistically significant. Mental health problems were strongly associated with psychosocial reactions and moderately correlated with burnout. In contrast, mental health problems were negatively related to relationship quality which indicated poorer perceived relational functioning among individuals reporting greater psychological distress. Psychosocial reactions were positively correlated with burnout and negatively correlated with relationship quality. Burnout also demonstrated a significant negative correlation with relationship quality.

Conditional Process Analysis

Based on the preliminary support provided by the correlational patterns, a conditional process analysis using PROCESS macro for SPSS (Model 88; Hayes, 2022) was used to study the direct and indirect effects of emotional labor on mental health problems via psychosocial and emotional reactions to pain and burnout, while testing the moderating role of quality of relations. All regression coefficients are reported as unstandardized estimates with 95% confidence intervals.

Direct Effect

Table 2 shows that the direct effect of emotional labor on mental health problems was significant indicating that high level of emotional labor was associated with more mental health problems in working individuals with chronic nonspecific musculoskeletal pain. This finding suggests that emotional labor independently contributes to psychological distress beyond the mediating mechanisms included in the model.

Table 2

Conditional Process Analysis (PROCESS Model 88) Predicting Mental Health Problems Among Working Individuals with Chronic Nonspecific Musculoskeletal Pain (N=210)

Predictors	Outcome Variables								
	PSER (M1)			BO (M2)			MHP (Y)		
	<i>B</i>	<i>SE</i>	95% CI [LL, UL]	<i>B</i>	<i>SE</i>	95% CI [LL, UL]	<i>B</i>	<i>SE</i>	95% CI [LL, UL]
EL (X)	0.48**	0.18	[0.12, 0.83]	-0.01	0.02	[-0.05, 0.02]	0.15***	0.03	[0.09, 0.21]
PSER (M1)				0.03***	0.01	[0.01, 0.04]	0.18***	0.04	[0.10, 0.26]
BO (M2)							0.39	0.49	[-0.57, 1.36]
QR (W)							0.08	0.36	[-0.63, 0.79]
PSER x QR							-0.003*	0.002	[-0.02, -0.01]
BO x QR							-0.002	0.02	[-0.04, 0.04]
Model Fit	$R^2 = .03, F(1, 208) = 6.88, p = .009$			$R^2 = .08, F(2, 207) = 8.67, p < .001$			$R^2 = .49, F(6, 203) = 32.33, p < .001$		

Note. EL=Emotional Labor, MHP=Mental Health Problems, PSER=Psychosocial and Emotional Reactions, BO=Burnout, QR=Quality of Relations; X=Independent variable, Y=Dependent variable, M1=Mediator 1, M2=Mediator 2, W=Moderator; CI=Confidence Interval, LL=Lower limit, UL=Upper limit

* $p < .05$, ** $p < .01$, *** $p < .001$

Mediation Effect

Emotional labor significantly predicted psychosocial and emotional reactions to pain indicating that individuals who reported higher emotional labor also experienced greater psychosocial and emotional responses to their pain condition. In turn, psychosocial and emotional reactions to pain significantly predicted mental health problems. These results indicate that psychosocial and emotional reactions to pain functioned as a significant mediator in the relationship of emotional labor and mental health problems.

Emotional labor did not significantly predict burnout, suggesting that emotional labor was not directly related to higher levels of burnout in this sample. However, burnout was significantly associated with mental health problems which indicated that individuals experiencing greater burnout reported higher levels of psychological distress. Despite this significant association with the outcome variable, the absence of a significant relationship between emotional labor and burnout indicates that burnout did not serve as a primary mediator linking emotional labor to mental health problems within the present model.

Overall, these findings suggest that pain-related psychosocial and emotional reactions represent a more immediate psychological pathway linking emotional labor to mental health problems than longer-term occupational exhaustion.

Table 3

Conditional Indirect Effects of Emotional Labor on Mental Health Problems at Levels of Quality of Relations (N=210)

Indirect Pathway	Quality Relations	of Effect	Boot SE	Boot 95% CI	
				LL	UL
EL → PSER → MHP	Low	0.06	0.02	0.02	0.11
	Medium	0.05	0.02	0.01	0.10
	High	0.04	0.02	0.01	0.08
EL → BO → MHP	Low	-0.01	0.01	-0.02	0.01
	Medium	-0.01	0.01	-0.02	0.01
	High	-0.01	0.01	-0.02	0.01
EL → PSER → BO → MHP	Low	0.01	0.01	-0.00	0.01
	Medium	0.01	0.00	0.00	0.01
	High	0.01	0.00	0.00	0.01

Note. PSER=Psychosocial and Emotional Reactions, EL=Emotional Labor, MHP=Mental Health Problems, BO=Burnout.

The moderating role of quality of relations was examined in the associations between the mediators and mental health problems (Table 3). The interaction between psychosocial and emotional reactions to pain and quality of relations was significant. This interaction indicates that the relationship between psychosocial and emotional reactions to pain and mental health problems varied depending on the level of relationship quality. Conditional effects suggested a buffering pattern: psychosocial and emotional reactions were more strongly associated with mental health problems when quality of relations was low, whereas this association weakened as relationship quality increased. These results suggest that supportive relationships may mitigate the psychological impact of pain-related emotional distress among individuals with chronic pain.

In contrast, the interaction between burnout and quality of relations was not significant which indicated that quality of relations did not significantly moderate the association between burnout and mental health problems. This suggests that relational resources may be particularly relevant in buffering immediate emotional responses to pain rather than longer-term occupational exhaustion.

Summary of Results

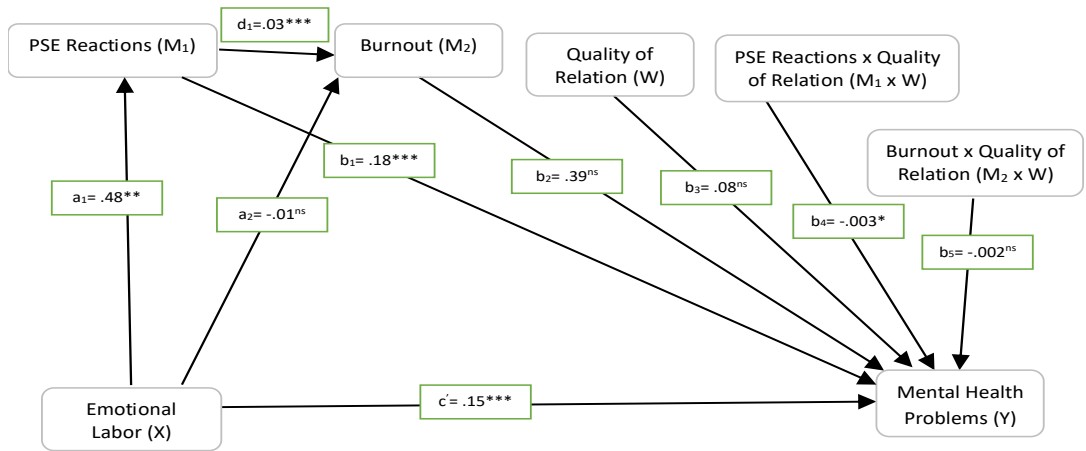


Figure 1: Statistical model diagram of conditional effect on mental health problems in working individuals with CNMP

Summarized results (Figure 1) indicated that emotional labor was significantly associated with mental health problems among working individuals with CNMP. Importantly, the findings demonstrated that this relationship was primarily explained through psychosocial and emotional reactions to pain which significantly mediated the association between emotional labor and mental health problems. In contrast, burnout did not emerge as a significant mediating mechanism which suggested that psychological distress in individuals with CNMP is less likely to be explained by the long-term occupational exhaustion and is more strongly influenced by immediate emotional and psychosocial responses to pain. Furthermore, quality of relations moderated the relationship between psychosocial and emotional reactions to pain and mental health problems in a way that the adverse effects of these reactions were weaker when individuals reported higher-quality relationships. Overall, the findings highlight that pain-related emotional and psychosocial responses, rather than burnout, represent the key pathway through which emotional labor contributes to mental health problems while supportive relationships serve as an important buffering resource.

Discussion

This study examined a conditional process model linking emotional labor to mental health problems among working individuals with chronic nonspecific musculoskeletal pain (CNMP) with psychosocial and emotional reactions to pain and burnout as mediators and quality of relations as a moderator. Overall, the findings supported the hypotheses partially. Emotional labor was directly associated with mental health problems and psychosocial and emotional reactions to pain mediated this relationship significantly. However, burnout did not emerge as a significant mediator. Additionally, quality of relations moderated the association between psychosocial and emotional reactions to pain and mental health problems indicating a buffering pattern.

Consistent with the hypothesis, emotional labor indicated significant direct association with mental health problems which supports occupational stress research suggesting that sustained emotional regulation in professional roles can drain psychological resources and increase distress (Chen et al., 2022; Suh & Punnett, 2022). From the perspective of the Job Demands–Resources (JD-R) theory, emotional labor represents a demanding aspect of work that requires continuous psychological effort (Bakker et al., 2023). Individuals with CNMP already experience reduced physical and emotional resources due to persistent pain and these additional demands of regulating emotions during workplace interactions may intensify psychological strain and contribute to poor mental health outcomes.

A key contribution of this study is the finding that psychosocial and emotional reactions to pain serve as the primary mechanism which link emotional labor to mental health problems as emotional labor was associated with strong pain-related emotional responses which in turn predicted more psychological distress.

This pattern aligns with Conservation of Resources (COR) theory suggesting that stress emerges when individuals perceive a loss or depletion of their valued resources (Hobfoll, 2011). In the context of CNMP, emotional labor may intensify the emotional burden of pain by increasing cognitive and emotional demands despite the fact that individuals are already coping with chronic physical discomfort. These findings extend research on CNMP by indicating that workplace emotional demands can shape how individuals psychologically experience and respond to chronic pain conditions.

Contrary to hypothesis, burnout did not significantly mediate the relationship of emotional labor and mental health problems. Although psychosocial and emotional reactions were associated with burnout but burnout did not uniquely predict mental health problems when emotional reactions were considered simultaneously which suggested that immediate emotional responses to pain was more influential in explaining psychological distress than longer-term occupational exhaustion. In chronic pain population, psychological strain may arise directly from ongoing emotional reactions to pain (Kovačević et al., 2024; Landmark et al., 2024) rather than through the gradual development of burnout which highlight the importance of distinguishing between proximal and distal stress processes.

The results also indicated that quality of relations moderated the association between psychosocial and emotional reactions to pain and mental health problems (Philpot et al., 2020) and the association between these reactions and psychological distress was strong when relationship quality was low and weak when relationship quality was high. This finding is consistent with COR theory and emphasize on the protective role of social resources in buffering stress and resource loss (Hobfoll, 2011). Supportive relationships may provide emotional validation, understanding and practical support which reduce the psychological impact of pain-related emotional distress in individuals. However, quality of relations did not moderate the burnout pathway which suggest that relational resources may primarily buffer immediate emotional distress rather than broader occupational exhaustion.

Overall, the findings offer several conceptual insights as they highlight pain-related emotional processes as a central pathway through which emotional labor affects mental health among individuals with CNMP and suggest that burnout play a less direct role in this relationship. These findings advance the understanding that how workplace emotional demands interact with pain-related psychological processes to influence well-being by integrating occupational stress theory with chronic pain perspectives. These findings also have practical implications as interventions aimed to improve the well-being of employees with CNMP should address emotional labor demands and strengthen capacity of the individuals to manage pain-related emotional reactions. Workplace programs that promote adaptive emotion regulation, encourage supportive communication and reduce excessive emotional display requirements can help in mitigating psychological strain. Additionally, to foster supportive relationships within workplaces and families may serve as an important protective resource for individuals who manage chronic pain while remaining engaged in their job.

To summarize, the present study demonstrates that emotional labor contributes to mental health problems among working individuals with CNMP primarily through high psychosocial and emotional reactions to pain while supportive relationships can help to buffer these effects. These findings emphasize on the significance of considering both occupational demands and relational resources when addressing psychological well-being in individuals living with chronic pain.

Limitations and future directions

This study has some limitations which need to be considered. Firstly, the cross-sectional correlational design used in the study limits causal inference and prevents conclusions about temporal ordering among emotional labor, psychosocial and emotional reactions, burnout and mental health problems. Longitudinal or experimental designs are needed to confirm the proposed mechanisms. Secondly, reliance on self-report tools may have led to common method bias and subjective reporting effects, although established instruments with adequate reliability were used. Thirdly, mixed recruitment strategies (clinics, workplaces and online self-selection) may limit sample representativeness and generalizability to all working individuals with chronic

nonspecific musculoskeletal pain. Fourthly, despite prior checks for measurement equivalence and cultural appropriateness, the exclusive use of English-language measures may have excluded individuals with lower language proficiency. Mental health outcomes were assessed via self-report rather than clinical diagnosis and no follow-up assessment was conducted, despite providing referral information for distressed participants. Most importantly, future research should explore other factors which have limited the role of burnout as a mediator in the present study. For example, occupational context, stage of chronic pain experience or variations in job demands may influence whether burnout emerges as a central mechanism that link emotional labor to mental health outcomes. Examining other contextual and psychological moderators such as workplace support, coping strategies and organizational climate can further clarify the conditions under which emotional labor contributes to psychological distress in individuals living with chronic pain.

Conclusion

This study demonstrates emotional labor as a significant occupational stressor associated with mental health problems among working individuals with chronic nonspecific musculoskeletal pain. Psychosocial and emotional reactions to pain emerged as the primary mechanism to link emotional labor with mental health problems, while burnout played a limited role. Quality of relations showed a modest buffering effect, underscoring the importance of relational resources in chronic pain contexts. These findings highlight the value of emotion-focused and relational approaches in supporting the mental health of workers living with chronic pain.

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China–Pakistan Economic Corridor (CPEC) and Environmental Security Challenges: Policy Responses

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Pakistan is highly at risk due to its fragile climate, which requires immediate attention when developing infrastructure along the China–Pakistan Economic Corridor (CPEC), a prominent project of the Belt and Road Initiative proposed by the Chinese government. This study focuses on environmental security risks arising from major CPEC projects, including coal-fired power generation, expansion of transportation systems, deforestation, changes in land use, and lax enforcement of regulations. The qualitative research design approach was undertaken using secondary data, including peer-reviewed articles, policy documents from relevant governments, environmental legislation, and reports on the development challenges facing CPEC for the period 2015 to 2025. The research is carried out from a perspective of both green politics and environmental security and seeks to connect the varied and sometimes contradictory stakes in corridor governance in the economic sphere. The results indicate that it is not development per se that is the root of the issue, but rather a lack of integration between the environmental assessment, monitoring, and enforcement processes in project planning and implementation. The article thus recommends that the implementation of EIA be tightened, that alternative uses of clean energy be promoted, that monitoring at the project level be strengthened, and that ecological governance by communities be strengthened for a greener CPEC .

Keywords: CPEC, environmental governance, ecological security, environmental impact assessment, sustainable development

As part of Pakistan's extensive development initiatives, the CPEC stands out as one of the most crucial transport corridors, connecting infrastructure development, energy initiatives, and wider regional connectivity under the Belt and Road Initiative. However, it is not possible to measure its importance solely in economic terms. The corridor also has significant environmental issues associated with electricity from fossil-fuel facilities, transport emissions, land-use change, and impacts on ecologically sensitive areas. This article presents three core arguments: CPEC, in its environmental dimensions, needs to be critically analysed in the context of environmental governance. The ecological concern isn't just the pressure from large projects, but the lack of progress in developing environmental protection, monitoring, and enforcement regulations as projects rush

forward. The paper therefore examines how CPEC has produced environmental security challenges and what policy responses are needed to address them in a more sustainable way.

Figure 1

Figure 1. Map of Pakistan and neighboring states



Figure 1 shows Pakistan's regional location in relation to surrounding countries relevant to the CPEC corridor.

This road network was supposed to make trade cost and time-efficient by decreasing the expenditure and time to transport merchandise, to China from the Gwadar Port, which were taking 11 to 16 days more through the route of South China Sea and Straits of Malacca (Ashraf & Shiyuan, [2022](#)).

In 2016, the mutual space and satellite projects between China and Pakistan under the umbrella project CPEC were announced. CPEC, is a vital part of the bigger BRI project for boosting communication, connectivity, collaboration, and trade amongst the states of Eurasia (Khan, [2019](#); Khan, [2020](#)). As Marshall Plan was used for the reconstruction of Europe after WWII in terms of its probable impact on the region and the interest displayed by several states in partaking in the initiative is also sometimes compared with CPEC (Rauf, [2017](#)). CPEC is an expedition of fiscal incorporation of Eurasia, particularly for Pakistan; it includes around \$62 billion in energy, trade, infrastructure, and other development projects (Hussain et al., [2021](#); Rehman, Khan, & Jaffry, [2017](#)). Yet, this mega project involves three probable ecological hazards, ramifications of which can aggravate climate change and vulnerabilities for unstable Pakistan's economy.

The main environmental apprehension associated with CPEC is regarding the energy plans since three-quarters of the new intended energy would be produced from conventional coal-fired power plants, which are the key suppliers of CO₂ emissions and pollution, eventually causing global warming and weather change. The second vital environmental concern is associated with the enormous removal of trees to lay several huge road networks from China to Pakistan. Tree cutting can cause a huge concentration of CO₂ emissions alongside road networks. The third grave environmental peril of CPEC is automobile trafficking since it is intended for the Karakorum highway to bear up to 7000 trucks every day that has discharge up to 36.5 million tons of CO₂. Nevertheless, the CPEC permits Pakistan to handle the energy crisis and improve worn-out infrastructure regardless of all the environmental menace involved in it, but once this project is over, Pakistan will have become a chief contributor to CO₂ discharge and might rank worst in the global climate risk index provided no suitable corrective measures are planned to reduce the environmental perils. For that reason, it is highly critical for Pakistan to evaluate the probable environmental effects of the energy, infrastructure, and transportation projects of CPEC. Besides, scientists from both Pakistan and China should team up to cope with the environmental outcomes of CPEC projects (Kouser, Subhan, & Abdullah, [2019](#)). This paper analyzes the impact

of CPEC as an SEZ on the environment of Pakistan and how Pakistan and China should work together on this grave issue.

Theoretical Framework

This study uses green politics and environmental security as complementary analytical lenses. Green politics questions development models that treat nature as secondary to economic growth and draws attention to the political choices behind environmental harm. Environmental security is an important part of understanding the potential long-term health, livelihood, water and growth risks to local security caused by ecological degradation related to infrastructure, energy production, transport corridors, and land-use change. As regards CPEC, such theories are applicable, as environmental harms are not necessarily created by the projects themselves but rather result from poor governance, insufficient control, and a higher priority given to the speedy delivery of economic benefits. The framework therefore links corridor development with the institutional and political conditions that produce ecological insecurity in Pakistan.

Model Green Belt and Road Initiative

The green theory enables IR students and thinkers to re-evaluate the link between the country's economy as well as the environment. International Relations usually set this in the perspective of globalization perceived from the inadequate standpoints of the nations. However, the process of globalization also generates better chances for raising mutual comprehensive ecological principles (Stephen McGlinchey, [2021](#)). Besides, the Green theory can fundamentally challenge the notion of autonomous nation-states competing with each other and is, therefore, part of the "post-Westphalian" trend in International Relations contemplation. The larger role the green theory plays, or its capability for a serious commitment with IR, certainly is because of its diverse origins, considering the environmental ecosystem a preliminary point and rising above our existing political-economic configurations. Green theory not only offers an unusual depiction of our world but also a unique reason for grasping it and what can we do to reform it. IR theory is probable to be reshaped by green theory, but not because the greens would beat the disagreements but since the IR philosophers will unavoidably have to offer a logical description of the solution of living sustainably on the earth, which shows that hypothesize about the state-centric 'international relations/order might stop one day, and we would have to seek after a "different political point of reference" in human liaisons, for example, social movements or policy networks, etc. (Dyer, [2018](#)). CPEC does affect the environment, so the Green Politics theory is applied in this article.

Method

This study adopts a qualitative research design to examine the environmental security implications of CPEC. The analysis is based on secondary sources, including peer-reviewed journal articles, official government documents, environmental laws and policy frameworks, reports by national and international organizations, and selected media sources used for policy context. The study focuses on the CPEC period between 2015 and 2025, with particular attention to the launch and implementation of the major CPEC projects. Sources were chosen for four themes based on relevance: energy projects, transport infrastructure, change of use, and environmental regulation. Thematic content analysis is applied in this study, which consists of three steps. First, sources were reviewed to identify common environmental issues related to CPEC. Second, these concerns were aggregated into themes, including: Coal Dependence, Transport Emissions, Deforestation, Environmental Assessment, and Institutional Enforcement. Third, an interpretation of the findings was made within the context of green politics and environmental security to evaluate the impact of governance decisions on ecological outcomes.

CPEC as Part of BRI

CPEC must be seen as part of the larger Belt and Road Initiative; however, the focus here is not solely on its geographic description but also on its environmental dimension. CPEC is considered a flagship connectivity project, encompassing four areas: energy production, transportation infrastructure, logistics systems, and industrial development. Its presence not only has economic implications but also strains land use, water quality, health, and ecological services. Thus, the relevance of BRI in this article is not limited to historical or strategic contexts, but rather arises when infrastructure projects can increase environmental risk through insufficient regulatory and assessment processes – especially on a large scale.

In 2013, during the ASEAN summit in Indonesia, Xi pronounced his plans for the Maritime Silk Road for the 21st century. China will finance or invest in port expansion and growth alongside the Indian Ocean, from the Asian Southeast to East Africa and other parts of Europe, to adjust to the rising marine trade. Presently, above sixty states making up two-thirds of the total population of the world have shown curiosity in being part of this venture (Alam, Bibi, & Waheed, 2023). It has been estimated that the largest profit so far is \$60 billion. An estimated \$200 billion on these efforts has already been invested by China, and Morgan Stanley has estimated that by 2027, the general expenditure of China for BRI can reach \$1.2–1.3 trillion, albeit calculations from different sources vary (Chatzky & McBride, 2020).

Figure 2

Belt and Road Initiative geographic spread.



Figure 2 illustrates the wider regional setting within which CPEC is located.

CPEC Routes

The route structure of CPEC matters because it passes through diverse ecological and socio-economic zones. Instead of listing route details at length, it is more important to note that road expansion, freight mobility, and associated construction activity can accelerate deforestation, soil disturbance, emissions, and pressure on local ecosystems. The environmental significance of the routes therefore lies in their cumulative ecological footprint rather than in their geographic description alone.

Initially, Pakistan was in favor of building a CPEC route from Western Pakistan by way of Zhob and Quetta to help develop Baluchistan and Khyber Pakhtunkhwa. However, later, it was decided that the CPEC Eastern route would cross Rawalpindi, Faisalabad, Multan, and Pindi Bhatia, whereas the Western Route would run through Northeastern Baluchistan from the towns of Kalat Quetta and Zhob. The key CPEC route begins from Xinjiang, China, to Karachi, Pakistan, and the main objective of this corridor is to target easy trade

alongside a path linking Gwadar and Kashgar through the laying optical fiber, highways, railways, and oil and gas pipelines. Pakistan and China both have teamed up to fortify the amity, particularly at the deepwater port of Gwadar (Khan, [2019](#)), which is meant to facilitate convenient international trade, especially in Arabian and Asian states (Rahman et al., [2022](#); Furqan, [2018](#)).

Special Economic Zones (SEZ) in Pakistan and SEZ Act (2012)

The SEZ framework is relevant to this study because industrial zones under CPEC may intensify environmental pressures if environmental regulation is treated as secondary to investment facilitation. While the legal and institutional structure of SEZs supports industrial growth, the environmental question is whether waste management, emissions control, land-use regulation, and compliance monitoring are adequately built into zone planning and operation. This concern makes SEZ governance central to the environmental assessment of CPEC.

In 2010, the SEZs Act was formulated to encourage the development of SEZs in Pakistan, and later in 2016, it was amended and is now known as the SEZs (Amendment) Act 2016. The fundamental purpose of the amendments was to embolden the development of SEZs and make them more business-friendly and inviting for investors.

The Mechanism for SEZ Development

The Amendment Act 2016 on SEZ allows the private parties to institute the SEZs, while Federal or Provincial Governments can inaugurate them, or the government can also collaborate with the private parties through a partnership, i.e. Public Private Partnership (PPP). Pakistani government persuades the development of SEZs via PPP to gratify the concerns of stakeholders about lucidity, security, impediments, etc. SEZs (Amendment) Act 2016 entitles the BOA to approve the zone application put forward by every provincial SEZ authority through the Board of Investment (BOI). Different provinces might have named PIPA differently, such as the Sindh Board of Investment or Punjab Board of Investment and Trade; it is supposed to work as the main body to endorse national and international investment. It can also help enterprises and zone developers regarding miscellaneous matters.

SEZ Act (2012) allows the provincial governments to form SEZ authority in each province of Pakistan (Khan & Khalid, [2018](#)). The zone developers and select industries will submit applications to the SEZ authorities in their respective provinces and forward the application to BOI. The responsibility of providing the utilities and infrastructure such as electricity, waste disposal, gas, water, etc., is also the liability of SEZ authority, and it must seek approval of its rules and regulations by BOA. Under the 2016 SEZ Amendment Act, Provincial SEZ authorities have been designed in all provinces that are in working condition. Following are the names of SEZs Provisional Authority:

1. “Special Economic Zone Authority” (SEZA), Sindh, under the leadership of Chief Minister Sindh
2. “Baluchistan’s Special Economic Zone Authority”
3. “Special Economic Zone Authority”, Punjab
4. Khyber Pakhtunkhwa Economic Zone Development and Management Committee

BOI under the SEZ Act is supposed to create sync between SEZ authority and BOA in addition to assisting the zone developers, SEZ authorities, and zone enterprises and endorsing the SEZs.

Infrastructure Facilities

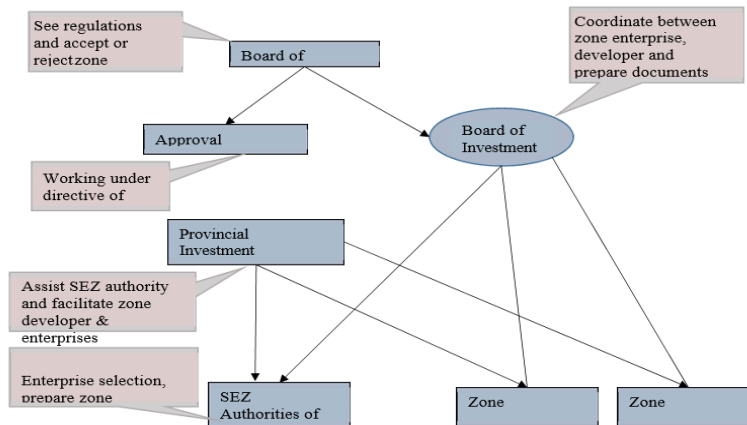
The amendment Act of SEZ 2016 makes the Provincial and Federal Governments liable to take necessary measures for the community or public utilities and infrastructure to the SEZs whose developers can set up electric power generation plants to meet the increasing need for electricity within the region.

Inducements in SEZ Amendment Act 2016

These inducements are additional to the current profits usually valid under international agreements of Pakistan, for example, FTA and treatment under GATT and GATS, etc. These incentives are intended for people the specific economic zones by enticing fresh and current industries and repositioning feasible Chinese plus other overseas businesses. The list of incentives for the zone developers and enterprises is declared in the act, and this is a major factor in creating the value proposition for SEZs. The details of incentives for both are as follows.

Figure 3

SEZ incentives for developers and enterprises.



This figure summarizes the main incentives associated with the SEZ framework discussed in the text.

Incentives for Enterprises

1. "One-time immunity from taxes and customs duties on importing plants and machinery into SEZ except for products/goods listed under Chapter 87 of the Pakistan Customs Tariff, which need verification by the BOI for setting up in that zone.
2. For the next ten years, exemption from all taxes on income for the firms starting commercial production by the 13th of June 2020 in the SEZs. On 13th June, the enterprises that are starting commercial production in the zones will be entitled to the exemption for the next five years.

Incentives for Developers, Special Purpose SEZs, Industries

The further advantages will only be awarded after the BOA finds them to be reasonable on account of an economic impact assessment;

The BOA is authorized to prepare an economic impact assessment of an SEZ within five years from the date the contract is signed and within the first year of the functioning of a firm”

Labor laws

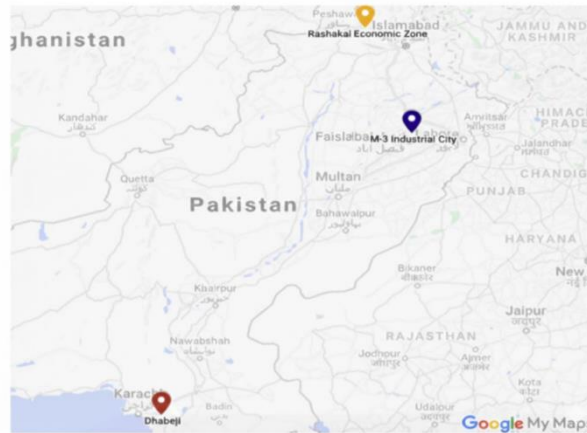
According to the Act, the already existing labor and employment laws of Pakistan are applicable in SEZs. This will decrease the business expenditure and attract fresh investments to Pakistan. Enticements for SEZs announced by the government are another step to attract international investments in priority SEZs (Abbas & Ali, 2017).

SEZs under CPEC

SEZs under CPEC are often discussed in terms of industrial opportunity, employment, and regional development. However, their environmental implications require equal attention. When industries are concentrated in corridor linked areas, the environmental effect can be put under stress if environmental standards are not consistently enforced – causing issues for the environment, including land, water systems, waste and air quality. The environmental performance of SEZs needs to be measured beyond the investment results in terms of compliance, monitoring, and ecological protection measures will also be taken.

Figure 4

Locations of selected SEZs in Pakistan



As seen in figure 4, there are a number of major SEZs linked with the CPEC framework with a spatial distribution.

CPEC and Environment

The environmental aspect of the CPEC cannot be sidelined and is integrated with the other aspects of the project. The biggest concerns are emissions from coal-fired power generation, transportation emissions, land clearance, and inadequate environmental protection. These problems accumulate and compound. They will not come solely from one project, but from the cumulative impacts of energy, road, and industrial growth within a governance model that ensures a level playing field for the environment. Thus, the analysis of CPEC must pay attention to the externalisation of environmental costs of the development priorities to communities and ecosystems, where compliance is weak.

It is a three-phase project. The first phase was to eradicate communication and infrastructure blockage that included several hydro, coal, and various new energy projects. As stated by the International Energy Agency in its most recent coal report, Pakistan possesses more than 4GW of fresh, custom-made coal power plants, and almost the same number of power plants are in the pipeline. It was anticipated that by 2024 the coal consumption will grow at 9 percent per annum. Besides, a new highway from Gwadar has to be built across the country to the Khunjerab pass, the northern border with China. By now, the first phase is over, and in the second phase, which has started, the emphasis is on industrialization and agriculture along with other sectors for Pakistan's economic boom. But the question is, can any of these CPEC projects contribute to the climate crisis? The Mauna Loa observatory in Hawaii documented the atmospheric carbon concentrations and found them over 400 parts per million before such excessive carbon was found in the atmosphere of the Earth for over 2.5 million years. The intensity of the climate crisis is far imaginable, and it's getting graver day by day, and the global biodiversity damage is speeding up at an extraordinary rate. The temperature increase has made the Hindu Kush and Himalayan region shifted than formerly imagined (Beg, Baig, & Khan, 2018). The difference between a global average temperature rise of 2C and 1.5C could be 50 percent of their glacial melting instead of 35 percent

By 2020, Carbon emissions should be reduced by 2.7 percent per annum only to meet the Paris Agreement target of 2C. This reduction is three times more speedy than what states agreed to. According to a study in *nature*, the difference between 1.5C and 2C of warming has caused 150 million deaths, mainly in Africa and Asia. On account of the excessive usage of the petrol, coal, diesel, and furnace oil consumed in a non-industrial economy, Pakistan is already facing deadly air pollution, which is expected to get worse when more power plants are constructed in compliance with a substantial portion of the first phase of CPEC and if the government fails to take corrective measures regarding the substandard diesel and petroleum products obtainable in the state, the old heavy vehicle on the planned Khunjerab Gwadar highway will continue to be a key factor of this health crisis. By the end of this century, global temperatures may supposedly go up as much as 4.9 C, and in that scenario, there will be no agriculture in most of Pakistan by that time. At the 2017 “World Economic Forum”, China pleaded with the global leaders to abide by the Paris Agreement; however, in the CPEC, environmental commitment has been overlooked (Alam, 2020). Pakistan must take appropriate and in-time action to ensure the deterrence of ecological dilapidation or its people might face grave repercussions owing to the undesirable environmental impacts that can be widespread.

Some of the more challenges concerning Pakistan’s environment regarding CPEC are given below:

- Road Management in Pakistan
- Road Constructions and its effects on the environment
- Deforestation for Road Construction and their impact on the environment in the future
- Transport
- Coal Consumption and its effect
- Global Warming
- Agriculture runoff
- Emission of CO₂

A Legal Framework of “Environmental Impact Assessment (EIA)”

Environmental impact assessment (EIA) is essential under China and Pakistan's laws and the Declaration on Environment and Development to mitigate project adverse effects and protect ecosystems. EIA recommends measures for ecological concerns under CPEC. Introduced by Pakistan's 1983 Environmental Protection Ordinance, EIA required supporters to submit ecological impact reports at project start. The 1997 Pakistan Environmental Protection Act (PEPA) replaced it, mandating EIA submission before construction. However, Pakistan lacks legal provisions for SEA policies. Non-compliance with Section 12 and related rules can incur fines up to one million rupees and an additional hundred thousand rupees per day.

Mehmood Akhter Cheema, the Country representative of the International Union for Conservation of Nature (IUCN), made a powerful observation and expressed his speculation regarding the technical competence of environmental protection agencies to execute EIAs. This organization has been focusing on various ecosystems and protected areas. Furthermore, it has been working on sustainable development and biodiversity conservation in Pakistan, since 1985 (IUCN Pakistan). Also, he is unsure about the ecological footprint of this particular project which he believed is ambiguous. He added, saying that the government has not published what measures are to be taken to guarantee incessant progress, or else the government owns any better environmental supervising and reporting strategy. He urged the government to collaborate with IUCN and similar organizations for the provision of technical lapse regularly for all EIAs that must have been done before a venture commences. (Ali & Askari, 2023). Adil Najam, the dean of the “Fredrick S. Pardee School of Global Studies” at “Boston University”, stressed the requirement of the fundamental regulators that includes “provincial and federal environmental protection agencies”, as well as the climate ministry to accomplish EIAs

so that the government can formulate the most appropriate technology and standards to be implemented for every project (Durani & Khan, [2018](#)).

Coal Power Projects under CPEC

Coal power projects remain one of the strongest sources of environmental concern under CPEC because they increase emissions and deepen dependence on carbon-intensive energy at a time when Pakistan is already highly vulnerable to climate stress. The problem is not only technical or economic. It is also regulatory and strategic, because energy choices shape long-term environmental risk. The heavy reliance on coal in the development model can offer temporary relief through the easy availability of energy, but can also undermine ecological security, public health, and climate commitments if it isn't paired with a real effort to transition to cleaner sources.

China has also acknowledged its excessive use of coal which causes ruthless and harmful environmental blows. The latest data reveals some cutback in the usage of coal for the third year on the trot. Nonetheless, a current report by the "Natural Resources Defense Council" revealed that \$25 billion was invested by China in coal plans internationally between 2007 and 2015. This report castigated China and the rest of the G20 states for the investments, which violate the Paris Agreement's climate pledge. This reveals the major countries causing pollution are exhibiting their interest in curtailing climate-changing carbon emissions domestically but blatantly investing in fossil fuel projects globally. This is exactly the picture of Pakistan, which stopped using coal after being part of most international financial institutions, but soon Pakistan collaborated with China in setting up the new coal power plants. Under the 2015 CPEC initiative, the Chinese intended to sponsor different corporations and companies to invest US\$27.6 billion in infrastructure and energy ventures in Pakistan under CPEC, whereas Pakistan is financing US\$18.1 billion. According to the "Ministry of Planning and Development, and Reform of Pakistan", the coal-fired plants with the ability of 7,560 MW will be built as CPEC-energy main projects (Saeed, [2017](#)).

Green Politics and CPEC

Green politics strengthens the analysis of CPEC by showing that environmental harm is not an accidental by-product of development. It often happens because of political decisions that prioritise growth, speed, and investment over ecological protection. In this character, the CPEC demonstrates a broader development logic, whereby environmental costs are often syncretised in the aftermath. When applied to CPEC, green politics can help shed light on the reasons for insufficient environmental protection and the need for institutional reforms, while also providing language to promote sustainability.

Institutional arrangements, environmental governance capacity, and mechanisms for enacting environmental policies manifest significant differences between green politics in Pakistan and China. In Pakistan, multiple forces can shape environmental governance, including state institutions, environmental laws, judicial activism, civil society groups, and climate adaptation efforts. In the past, as in recent times with programs such as the Billion Tree Tsunami Project and other climate adaptation strategies, governments have increasingly focused on environmental sustainability. Nevertheless, environmental protection agencies still face challenges with funding, technical skills, inter-agency coordination, and enforcement capacity (Ali & Askari, [2023](#); IUCN, [2022](#)).

On the other hand, China has introduced environmental sustainability as part of its national development under the concept of "Ecological Civilisation," and has increasingly promoted the Belt and Road Initiative (BRI) as part of its international commitments on the environment. These are some of the specific features of the Chinese model that afford far greater implementation capacity than most developing countries can, namely, long-term planning, strong monitoring systems, and centralised governance. However,

sustainability issues persist in the context of overseas infrastructure development programs, such as those under the BRI, that clash with economic objectives (Aftab, [2020](#); Chatzky & McBride, [2020](#)).

Analysis of Pakistan and China illustrates that the environmental outcomes of CPEC are influenced by both policy commitments and the capacity of governance, regulation, monitoring, and stakeholders. Although Pakistan has taken some strides in raising environmental consciousness and formulating climate policies, their implementation remains hampered by challenges. Although China's strengths in institutional capacity offer lessons to other developing countries on environmental monitoring and compliance, the challenge of balancing economic development and ecological protection remains common to both countries. Instead, Green Politics should be seen as more than a normative concept but also an operational tool for assessing the success of environmental governance processes in major infrastructure projects.

Both the states, Pakistan and China, took certain actions on the environmental threats, (Jaleel & Habibullah, [2021](#)) and according to news reports, China and Pakistan have come to terms to convert the CPEC project into an exemplary “green belt and road scheme” to preserve and guard the regional natural environment. A meeting between a Chinese three-member delegation including the “Chinese Ambassador to Pakistan Nong Rong and Malik Amin Aslam, Special Assistant to the Prime Minister (SAPM) on climate change” was held to take this decision (Aftab, [2020](#)). This meeting also brought under discussion numerous vital green schemas, including climate adaptation, ecological safeguard, green economic revival, pure energies, air quality, and decline of calamity hazards and water preservation. SAPM Amin, while addressing the meeting, shared the objective of the government about the ‘Clean Green Pakistan Index’; and highlighted that the project intends to enhance the protected area of Pakistan to above 15 percent from the present 13 percent and produce 5,000 green jobs opportunities also. Besides, it was claimed by the Chinese ambassador that China was determined to support the apparition of Pakistan’s leader Imran Khan, and his initiative of a green economic revival plan after COVID-19 to reinstate the incomes of the people (Hasan, [2020](#)).

Discussions

The main finding of this study is that the environmental challenge of CPEC is fundamentally a governance challenge. Corridor development has moved forward more quickly than the institutions meant to assess, monitor, and regulate its ecological effects. The use of coal for energy generation, the rapid growth of road transport, change of land use and the industry cluster puts a combined strain on the environment. This suggests that the environmental future of CPEC will depend less on development rhetoric and more on the quality of environmental regulation, inter-agency coordination, and project-level compliance. The paper therefore shifts the debate from whether CPEC is beneficial in general to how it can be governed in a more ecologically responsible way.

The comparative analysis of Pakistan and China, and the subsequent findings, also indicated that institutional planning and implementation mechanisms are crucial to achieving environmental governance success in the context of the CPEC. While values for the environment, sustainability, and demands for ecological justice have received significant emphasis in the literature on Green Politics, there is also a need to examine the capacity of political institutions to adopt environmental policies. Environmental governance in Pakistan has taken a positive turn as a result of the government's actions in climate adaptation and environmental law; however, enforcement of these measures is hampered by administrative and resource gaps. However, environmental concerns can be sacrificed in the interests of winning over domestic or international investors and financial partners when implementing environmental policy, as has not been the case in China, where its relatively stronger capacity and monitoring systems have enabled better protection. (Ali & Askari, [2023](#); Aftab, [2020](#)).

The results suggest that environmental security threats arising from CPEC are not entirely attributable to infrastructure development. Instead, they stem from the dynamic interplay between development processes and institutional arrangements to manage environmental flows. They are, on the contrary, the result of the dynamics between developmental processes and institutions' capacities to address environmental impacts. So the efficiency of Green Politics cannot be judged solely on environmental hyperbole; it should be measured by measurable results: compliance with regulations, environmental monitoring, public involvement, transparency, and policy enforcement, etc. This approach will enable a more realistic assessment of sustainable development within the CPEC framework.

Export Processing Zones (EPZs), also called Special Economic Zones (SEZs), are geographic areas inside a state that are targeted to turn into a bustling economic activity zone by introducing policy or other support/aid, that is not offered to the economy of a country on the whole. EPZs may be useful in obtaining this by emphasizing enticements that decrease the costs to firms, but they can enhance the imports without boosting the trade balance other than encouraging directness, which is crucial to deem EPZ's effects on net exports.

To protect the country's climate, it is of extreme significance to recognize the fact that Pakistan is the 7th highest most affected country in the world, and the impacts of CPEC will be drastic. The regional economic and social growth must match the rules of ecological steadiness and sustainable progress. Durani & Khan. (2018) conducted a study and found that the carbon emissions of present coal-based power production plants have astounding consequences. The findings are worthy of citation here and have been listed in the table below: (Fatima, Salman, & NEDIM, 2017). Considering the findings of the study, several way-outs can be used to overcome the Environmental Challenges faced by the CPEC. Political parties should cooperate in the construction of CPEC; there should be compromised for their mutual benefit at the country-wise level; the details of the CPEC Project should be shared with all the political parties in the country to understand the nature of CPEC's success. Also, it includes the support to the foreign CPEC workers by the government and expedites the CPEC work for its territorial safety from external threats

Recommendations

Recommendations for policies should be prioritised following three criteria based on this study and the comparative discussion and evaluation of environmental governance capacity of Pakistan and China: (1) feasibility to implement the policy, (2) needed institutional capacity to implement the policy, and (3) environmental importance of the policy. This prioritisation approach acknowledges the principles of Green Politics, as it is based on achievable environmental outcomes rather than aspirational policies.

- Strengthen project-level Environmental Impact Assessment by requiring independent review, public disclosure, and post-approval monitoring for major CPEC projects.
- All the details of the CPEC Project should be shared with all the political parties in the country to understand the nature of CPEC's success to save it from environmental challenges and threats.
- The multi-dollar benefit must be discussed by the government with all the provinces to take their cooperation for CPEC to sustain it from environmental issues.
- There must be full support to the foreign CPEC workers by the government.
- The CPEC work must not be delayed by the government in order to escape the terrorists and other militants' hurdles in completion.
- The latest technologies must be utilized to control all kinds of pollution to maintain the CPEC environment stable and continuing.
- To secure the planet, we must raise the afforestation of planting more trees.

- Introduce Strategic Environmental Assessment for corridor planning so that the cumulative effects of roads, SEZs, and energy projects are considered together.
- Gradually shift future CPEC energy investment from coal toward solar, wind, and hydropower where feasible.
- Create a joint environmental monitoring mechanism involving federal and provincial agencies, local authorities, and independent experts.
- Enforce National Environmental Quality Standards more consistently in industrial and energy zones linked to CPEC.
- Include local communities in consultation, monitoring, and grievance procedures, especially in ecologically sensitive areas.
- Require regular environmental performance reporting for completed and ongoing projects to improve accountability and policy learning.

Methods and Solutions for Mitigating Climate Crises under CPEC:

Three practical directions are especially important for mitigating environmental harm under CPEC. First, afforestation and landscape restoration should be linked to project planning in areas affected by road expansion and land clearing. Second, cleaner production technologies and improved systems for controlling generated waste should become part of the compliance requirements for projects in the industrial and energy sectors. Third, environmental protection is the official's responsibility, not an afterthought or policy goal. Third, environmental protection is an official responsibility, not an afterthought or policy goal.

These measures are most effective when backed by monitoring, enforcement, and transparent reporting.

The most vital point to remember is that the future of our earth depends on trees. To secure the planet, we are in dire need of planting more trees. It is known to everybody that the projects included in CPEC are meant for the development of the northern areas of Pakistan; thus, the government must devise a policy to exclusively cater to the expansion and safety of its flora and fauna. If cutting a tree is indispensable for the progress of this project, planting more trees must be ensured to help filter the air and protect the land. Taking preventive measures by the government can help preserve the environment shun the loss of biodiversity and manage the floods in the region. Enormous forest area reduces the chances of landslides and soil erosion.

Use of Modern Technology

To control all kinds of pollution, the latest technologies must be utilized. The factories' chimneys should be lined with specific sheets so that the harmful pollutants would stick to them, in that way reducing the poisonous discharges into the air. Opting for the process of burning with the chimneys to control the pollution even further will be commendable. Most up-to-date methods of the disposal of waste and technologies should be implemented. The ultra-supercritical technology has been employed by China at its coal plants to produce energy which is the latest strategy of China to procure clean energy. The harmful effect of emission of energy obtained from coal is drastically lessened in the high-efficiency coal-fired power plant, but regrettably, Pakistan is deprived of this latest technology while several projects are being constructed, and a few are in the pipeline. Sadly, this side of the Environmental Impact Assessment (EIA) has been forgotten.

Environmental Protection Regulatory Framework (EPRF)

The factories and people working in the area have been provided with the guidelines for environmental regulations, and adopting and enforcing them must be mandatory. The implementation of these rules must be ensured by the government and the policymakers to evade carbon dioxide gas emissions more than the approved greatest quantity. The "National Environmental Quality Standards (NEQS)" recommended by the

“environmental legislators” must be enforced. Guidelines must be strictly followed to abandon the waste produced by the factories with appropriate dealing, to protect the marine life, air, and the whole general ecosystem. Managing industrial waste like harmful gases, residue, and liquids must be sternly administered, and it’s appropriate dumping should be checked to keep them within a controllable stage, those who break the rules must be dealt with firmly. By establishing and implementing straightforward guidelines and standard operating procedures (SOPs) for throwing away waste utmost emission levels by all industrial/power generation facilities can be ensured, and the reproduction units that breach the rules must be profoundly castigated (Durani & Khan, [2018](#)).

Conclusion

CPEC has major economic significance for Pakistan, but its environmental effects require much stronger analytical and policy attention. The study finds that the key problem lies in the weak integration of environmental governance into corridor planning and implementation. Coal dependence, transport emissions, land-use change, and uneven enforcement of environmental safeguards together create long-term ecological security risks. The article subsequently concludes that a more robust EA process, cleaner energy options, solid enforcement of regulations and increased community engagement are important. Without these measures, the developmental gains of the corridor may come with lasting ecological costs.

Pakistan must plan to generate energy from solar, wind, and hydro that are environmentally friendly and has fewer or no climatic hazards. Pakistani provinces such as Khyber Pakhtunkhwa and Gilgit have great potential to produce almost 5,000 MW through hydro. The study gave a framework to handle the environmental challenges and threats to CPEC by means of diverse parameters. The Government of Khyber Pakhtunkhwa government proposed the central government new projects that would produce 6,000 MW; however, the central government declined it (Baloch, [2018](#)). The development most often always plays havoc with nature and the environment. Bearing in mind Gwadar, its natural beauty, and its undamaged beaches, Pakistan must go for environment and nature-friendly projects to avert the catastrophic blows of progress.

Future Implications

Future research should move beyond broad policy description and examine environmental change at the project and community levels in corridor-affected areas. Greater attention is needed to implementation gaps in EIA practice, institutional capacity, and the comparative environmental outcomes of coal-based and renewable projects. Field-based and participatory studies would also help explain how local communities experience environmental risk and governance failures under CPEC.

Additionally, there is limited knowledge about the effectiveness of institutions in environmental governance related to CPEC projects. In future research, attention needs to be given to the implementation of EIAs not only as policy but also in practice, with a focus on mitigating gaps in regulatory enforcement and on how contractors and project developers behave when it comes to compliance. There should be comparative case studies to understand the differences in environmental outcomes between coal-based energy projects and renewable energy projects under the framework of CPEC.

We need to further develop a theoretical framework on Green Political Theory and Environmental Security in the context of the national-scale transnational infrastructure regime (such as the Belt and Road Initiative). How development-related environmental trade-offs are argued to be necessary should be a subject of future scholarship, for example, by examining and challenging the forms of state discourse that tend to naturalize environmental trade-offs as a prerequisite for development in developing countries like Pakistan.

In methodological terms, future research needs to prioritize participatory methods with local actors, civil society organizations, and natural environment specialists as data sources, to move beyond state and elite sources. This would provide a more nuanced understanding of how people perceive environmental risk, how they adapt, and their socio-ecological resilience in corridor regions.

Lastly, there is an urgent need to monitor cumulative ecological changes over a longer timeframe to assess the long-term ecological impacts of coal emissions, deforestation, and alterations in land use patterns associated with SEZ development. However, unless the critical issues are studied properly, policy will revert to a reactive rather than a preventive mode, thereby reducing the effectiveness of environmental governance along the CPEC.

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Advancing Self-Determination in Pre-Clinical Nursing Students: A Needs-Based Approach for Hospital Training Programs

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The transition from academic learning to clinical practice is a pivotal stage in nursing education, where students must develop autonomy, competence, and relatedness—core components of self-determination theory (SDT). However, many pre-clinical nursing students face challenges that hinder these needs, particularly during hospital training programs. This study explores the self-determination needs of pre-clinical nursing students in Indonesia, adopting a mixed-methods design. Quantitative data from 243 students, gathered through a modified Self-Determination Scale, were analyzed using partial least squares structural equation modeling (PLS-SEM). Additionally, interviews with 20 students provided qualitative insights. Findings indicate that autonomy was significantly influenced by prior clinical experience ($\beta = 0.42, p < 0.001$), while competence was linked to academic preparation ($\beta = 0.38, p < 0.01$) and mentorship quality. Relatedness depended on team cohesion and gender dynamics, with female students reporting higher support levels ($\beta = 0.31, p < 0.05$). Autonomy-supportive supervision ($\beta = 0.47, p < 0.001$), structured mentorship ($\beta = 0.44, p < 0.001$), and cohesive team dynamics ($\beta = 0.36, p < 0.01$) emerged as key perceived supports for enhancing self-determination. Qualitative data revealed that supportive supervision fostered confidence, while micromanagement hindered autonomy. Competence grew with hands-on guidance, and meaningful peer interactions promoted relatedness. The study highlights the importance of addressing systemic and cultural factors to improve students' clinical learning experiences. These findings contribute to evidence-based strategies for fostering motivation, engagement, and preparedness in nursing students, enhancing their transition into professional practice.

Keywords: self-determination theory, pre-clinical nursing students, clinical education, mentorship, team dynamics, nursing education

The transition from academic learning to clinical practice presents a critical period in the professional development of nursing students. This phase requires students to apply theoretical knowledge in real-world contexts, fostering autonomy, competence, and a sense of relatedness—key components of self-determination theory (Ryan & Deci, 2000). However, despite the emphasis on experiential learning in nursing curricula, evidence suggests that many pre-clinical nursing students experience low levels of self-determination during hospital placements, which can hinder their ability to develop essential clinical competencies and adapt to the demands of professional nursing practice (Bilkes, 2023; Jardine-Garvey, 2023; Regaira-Martínez et al., 2023). Addressing this issue is crucial for improving the quality of nursing education and ensuring that graduates are well-prepared for professional practice.

Self-determination theory posits that individuals are more likely to achieve optimal functioning and well-being when their psychological needs for autonomy, competence, and relatedness are satisfied (Deci & Ryan, 2012). In the context of nursing education, autonomy refers to students' ability to make independent

clinical decisions; competence reflects their confidence and ability to perform nursing tasks effectively; and relatedness involves meaningful connections with peers, mentors, and patients (Jackson, 2020; Ljungbeck et al., 2021; Rose-Facey, 2020; Shen et al., 2024). Although these dimensions are critical to fostering motivation and engagement in clinical settings, research indicates that the clinical environment often lacks the support necessary to meet these needs. For example, inadequate mentorship, high workloads, and a fear of making mistakes frequently undermine students' autonomy and confidence, resulting in diminished self-determination (Reeve & Cheon, 2021; Zhou et al., 2023).

The significance of self-determination extends beyond individual students to the broader goals of nursing education and healthcare delivery. High levels of self-determination are associated with improved academic achievement, better problem-solving skills, and enhanced patient care outcomes (Bussard, 2015; Santana-Padilla et al., 2022; Wright & Scardaville, 2021; Young, 2024). Conversely, students with low self-determination may struggle with decision-making, exhibit lower engagement in clinical activities, and face higher risks of burnout or attrition (Al-Hoorie et al., 2022; Elshami et al., 2021; Reeve & Cheon, 2021; White et al., 2021). Despite these implications, limited research has systematically examined the specific needs and challenges related to self-determination among pre-clinical nursing students in hospital settings. Most existing studies have focused on general motivational factors or post-clinical professional outcomes, leaving a critical gap in understanding how to support students during this formative stage of their education.

To address this gap, this study explores the self-determination needs of pre-clinical nursing students during hospital training programs. By adopting a needs-based approach, the research aims to identify the barriers and facilitators to self-determination within clinical environments, providing actionable insights for educators and healthcare institutions. This focus aligns with the broader goals of advancing evidence-based educational practices and improving the quality of nursing education in Indonesia and globally. The following research questions guide this study:

1. What are the self-determination needs of pre-clinical nursing students during hospital training programs?
2. How do clinical environments influence the autonomy, competence, and relatedness of pre-clinical nursing students?
3. What strategies can be implemented to enhance self-determination among pre-clinical nursing students in hospital settings?

Addressing these questions is essential for bridging the gap between academic preparation and clinical practice, ensuring that nursing students are empowered to succeed in their professional roles. By identifying the factors that shape self-determination in clinical settings, this study aims to contribute to the development of more supportive educational and clinical practices, ultimately improving the outcomes of nursing education and healthcare services.

Literature Review

The concept of self-determination in education, rooted in Deci and Ryan's (1985, as cited in Deci & Ryan, 2012) Self-Determination Theory (SDT), has evolved significantly over the years. SDT identifies autonomy, competence, and relatedness as the three fundamental psychological needs that drive intrinsic motivation and personal growth. Recent studies emphasize the relevance of SDT in nursing education, particularly in fostering students' clinical competence and professional identity (Jackson, 2020; Ljungbeck et al., 2021; Rose-Facey, 2020; Shen et al., 2024). However, challenges remain in operationalizing these theoretical constructs within real-world clinical training programs.

Empirical evidence underscores the critical role of autonomy in pre-clinical education. Autonomy-supportive environments, characterized by opportunities for independent decision-making and reduced reliance on external controls, have been linked to higher motivation and improved learning outcomes (Bilkes, 2023; Jardine-Garvey, 2023; Reeve & Cheon, 2021; Regaira-Martínez et al., 2023). Nevertheless, research by Zhou et al., (2023) reveals that many clinical settings are dominated by hierarchical structures that limit students' capacity to exercise autonomy. This dynamic creates a mismatch between the theoretical principles of SDT and the practical realities of clinical education, leading to reduced self-determination.

Competence, the second pillar of SDT, has garnered substantial attention in nursing education research. Young (2024) demonstrate that students with high perceived competence exhibit better problem-solving skills and clinical decision-making abilities. However, the rapid pace and complexity of hospital environments often undermine students' confidence, particularly when mentorship is insufficient or inconsistent (Bilkes, 2023; Jardine-Garvey, 2023; Regaira-Martínez et al., 2023). This gap in support highlights the need for structured interventions that build students' competence while addressing situational barriers.

The role of relatedness in fostering self-determination has been explored in several recent studies. Positive interactions with peers, mentors, and patients not only enhance students' sense of belonging but also contribute to their emotional resilience and professional development (Al-Hoorie et al., 2022; Elshami et al., 2021; Reeve & Cheon, 2021; White et al., 2021). However, evidence from Coleman (2022) suggests that strained relationships in clinical settings, such as conflicts with supervisors or lack of peer collaboration, can significantly hinder relatedness. Addressing these relational challenges is vital for cultivating an inclusive and supportive clinical learning environment.

Despite the growing body of literature, significant gaps remain in understanding the specific mechanisms through which clinical environments influence self-determination. For instance, while studies have identified barriers to autonomy, competence, and relatedness, few have proposed actionable strategies for overcoming these challenges. Additionally, most research has focused on Western contexts, with limited exploration of self-determination in nursing education within diverse cultural settings such as Indonesia.

This study seeks to address these gaps by adopting a needs-based approach to examine the self-determination of pre-clinical nursing students in hospital settings. By integrating theoretical insights from SDT with empirical data, the research aims to develop evidence-based recommendations for enhancing self-determination in clinical education. This contribution is particularly significant given the increasing demand for well-prepared nursing graduates who can navigate complex healthcare environments with confidence and autonomy.

Method

Research Design

This study employed a mixed-methods design, combining quantitative surveys with qualitative interviews to provide a comprehensive understanding of the self-determination needs of pre-clinical nursing students. The mixed-methods approach is particularly suited to educational research, as it allows for the integration of statistical trends with rich, contextualized insights (Creswell & Clark, 2017). Quantitative data were used to identify patterns and relationships, while qualitative data provided a deeper exploration of the factors influencing self-determination.

Participants

The participants were pre-clinical nursing students enrolled in hospital training programs at private health colleges in Kota Padang, Indonesia. The choice of this location was based on the accreditation status of these institutions (accredited as "B" by the Health Colleges Accreditation Board), the availability of certified academic and clinical preceptors, adequate learning facilities, and their implementation of

professional nursing practices in teaching hospitals within the city. A total of 243 students were selected using stratified random sampling to ensure representation across clinical settings and demographic variables, including gender, academic performance, and prior clinical experience. Eligibility criteria included enrollment in a pre-clinical nursing program and active participation in hospital-based training within the last six months. Ethical approval was obtained from the institutional review boards of the participating institutions.

Table 1*Demographic Profile of Pre-Clinical Nursing Student Participants*

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	90	37.0
	Female	153	63.0
	High	72	29.6
Academic Performance	Medium	141	58.0
	Low	30	12.3
Prior Clinical Experience	Yes	134	55.1
	No	109	44.9

The stratified random sampling technique incorporated variables including gender, academic performance, and prior clinical experience. Selection of "B" accredited private health colleges in Kota Padang ensured institutions with standardized quality benchmarks, certified preceptors, and consistent professional nursing practices. By focusing on colleges with comparable accreditation levels, we minimized institutional variability that could influence self-determination measurements. However, future research should expand the sample to include diverse institutional types and accreditation levels to enhance generalizability.

Data Collection

Data were collected through validated instruments designed to measure the three dimensions of self-determination: autonomy, competence, and relatedness. The quantitative survey comprised a 45-item questionnaire adapted from Ryan and Deci's (2000) Self-Determination Scale, modified for clinical education contexts (Bussard, 2015; Santana-Padilla et al., 2022; Wright & Scardaville, 2021; Young, 2024). Each item was rated on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Qualitative data were collected through semi-structured interviews with a purposive subsample of 20 students, selected to ensure diversity in gender, academic performance, and clinical experience. The interviews explored participants' perceptions of autonomy, competence, and relatedness within clinical environments.

The modified Self-Determination Scale underwent rigorous validation, including expert panel review and pilot testing with 50 nursing students. Cronbach's alpha coefficients were calculated for autonomy ($\alpha = 0.82$), competence ($\alpha = 0.79$), and relatedness ($\alpha = 0.76$), demonstrating acceptable internal consistency. Confirmatory factor analysis supported the scale's three-dimensional structure through PLS-SEM measurement model evaluation, with composite reliability (CR) values ranging from 0.83 to 0.88 and average variance extracted (AVE) values ranging from 0.52 to 0.61 across the three constructs, confirming reliability and convergent validity for measuring self-determination in pre-clinical nursing students.

Data Analysis

Quantitative data were analyzed using descriptive and inferential statistics. Descriptive statistics were used to summarize demographic variables and overall self-determination scores, while partial least squares structural equation modeling (PLS-SEM) was applied to examine the relationships between clinical environment factors and the three dimensions of self-determination. PLS-SEM allows for the simultaneous testing of multiple relationships, providing a robust framework for understanding complex interactions (Cepeda-Carrión et al., 2022; Hair, 2020; Hair & Alamer, 2022; Manley et al., 2021). The qualitative data from the interviews were analyzed using Braun and Clarke's (2006) thematic analysis framework. The

process began with familiarization, during which transcripts were read and re-read to identify initial patterns. Codes were then generated inductively, capturing recurring ideas and experiences shared by participants. Coding focused on the dimensions of self-determination—autonomy, competence, and relatedness—while remaining open to emergent themes. To ensure consistency, two researchers independently coded the data and resolved discrepancies through discussion. The codes were then organized into broader themes, which were refined to reflect the nuanced interplay between clinical environments and self-determination needs. This rigorous approach ensured that the qualitative findings complemented and enriched the quantitative results. Data-method triangulation of quantitative and qualitative findings ensured the validity and reliability of the results (Creswell & Clark, 2017). On the other hand, we employed partial least squares structural equation modeling (PLS-SEM) using SmartPLS 3.0 software, applying a consistent bootstrapping procedure with 5,000 resamples to assess path coefficients, statistical significance, and model predictive capabilities, while simultaneously evaluating measurement and structural model quality through key indicators such as factor loadings, composite reliability, average variance extracted, and standardized root mean square residual (SRMR).

Ethical Considerations

All participants provided informed consent before data collection. To ensure voluntariness, participation was entirely optional and independent of academic standing or clinical placement outcomes; students were explicitly informed that their decision to participate or withdraw would have no bearing on their assessments, grades, or supervisory relationships. To address potential institutional power dynamics inherent in student populations, recruitment was conducted through neutral channels without the involvement of clinical supervisors or faculty who held evaluative authority over participants. Confidentiality and anonymity were maintained throughout the study. Participants were assured that their responses would be used solely for research purposes and that they could withdraw from the study at any time without penalty. The study adhered to the ethical guidelines outlined by the Indonesian Ministry of Health's Ethical Standards for Research, ensuring compliance with national regulations on human subjects' protection. This methodological framework ensures a rigorous and systematic exploration of the self-determination needs of pre-clinical nursing students, aligning with the study's objectives and research questions.

Results

Self-Determination Needs of Pre-Clinical Nursing Students

The descriptive analysis of the quantitative data revealed significant variability in the self-determination scores among participants. Autonomy, competence, and relatedness were measured as subdimensions, with average scores of 3.8, 3.5, and 3.7 out of 5, respectively. Table 2 presents the summary statistics for these dimensions:

Table 2

Descriptive Statistics for Self-Determination Dimensions Among Pre-Clinical Nursing Students

Dimension	Mean	Standard Deviation	Minimum	Maximum
Autonomy	3.8	0.9	2.1	5.0
Competence	3.5	1.0	1.8	5.0
Relatedness	3.7	0.8	2.2	5.0

The PLS-SEM analysis confirmed that the measurement and structural models demonstrated acceptable quality, as indicated by several key fit indices. The Normed Fit Index (NFI) was 0.92, exceeding the commonly accepted threshold of 0.90, signifying an excellent overall model fit. The Standardized Root Mean Square Residual (SRMR) was 0.045, well below the threshold of 0.08, indicating a close approximation of the model to the observed data. Additionally, composite reliability (CR) values for autonomy (0.88), competence (0.85), and relatedness (0.83) all exceeded the threshold of 0.70, and average variance extracted (AVE) values ranged from 0.52 to 0.61, exceeding the 0.50 threshold, further supporting convergent validity. Heterotrait-Monotrait ratio (HTMT) values were all below 0.85, confirming discriminant validity. These fit

indices collectively suggest that the relationships among the dimensions of self-determination—autonomy, competence, and relatedness—were adequately represented by the hypothesized model. This acceptable model quality strengthens confidence in the findings and underscores the reliability of the PLS-SEM results in capturing the self-determination needs of pre-clinical nursing students.

Table 3
PLS-SEM Quality Indicators for Self-Determination Needs

Fit Index	Value	Threshold for Acceptability	Interpretation
Normed Fit Index (NFI)	≥ 0.90	Excellent fit	
Average Variance Extracted (AVE)	0.57	> 0.50	Adequate convergent validity
Standardized Root Mean Square Residual (SRMR)	0.045	≤ 0.08	Good fit
Heterotrait-Monotrait Ratio (HTMT)	0.79	< 0.85	Discriminant validity confirmed
Composite Reliability (CR)	0.88	> 0.70	Acceptable composite reliability

Moreover, PLS-SEM analysis revealed that prior clinical experience had a significant direct effect on autonomy ($\beta = 0.42, p < 0.001$), while academic performance strongly predicted competence ($\beta = 0.38, p < 0.01$). Relatedness was influenced by gender ($\beta = 0.31, p < 0.05$) and team cohesion ($\beta = 0.36, p < 0.01$). Figure 1 illustrates the PLS-SEM model showing the pathways and relationships among the dimensions of self-determination and the influencing factors.

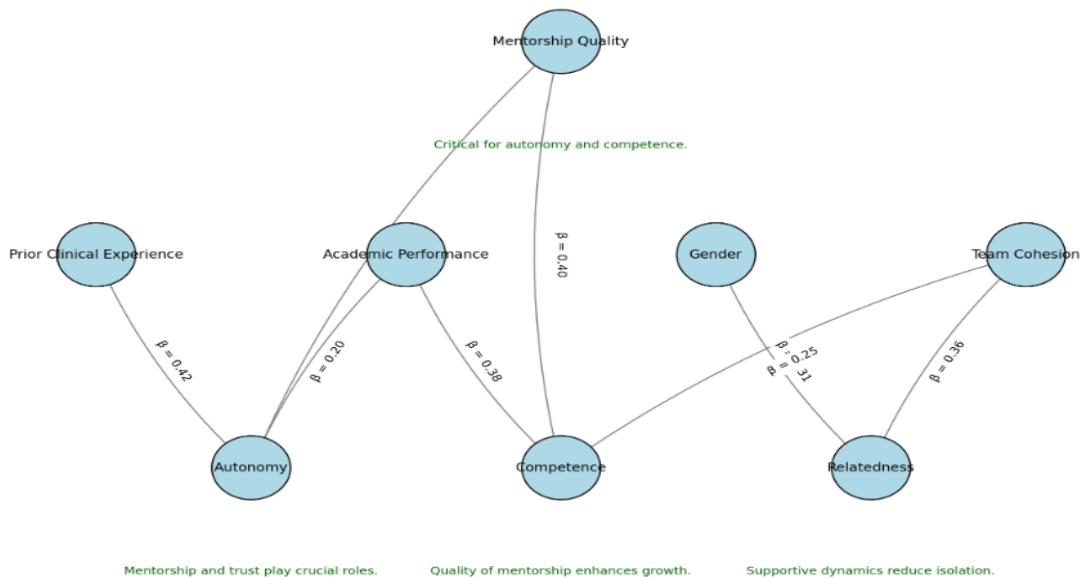


Figure 1. PLS-SEM Model: Self-Determination Needs

These findings indicate that autonomy is most directly associated with prior clinical exposure. Similarly, competence is significantly associated with academic preparation. The influence of gender and team cohesion on relatedness points to the role of social dynamics within clinical settings.

Qualitative data provided critical insights into these quantitative findings. Thematic analysis of the 20 interview transcripts yielded three primary themes: (1) Variability in Autonomy Support, (2) Mentorship as a Mediator of Competence Development, and (3) Relational Dynamics and Sense of Belonging. Several

participants emphasized the transformative role of autonomy in their clinical learning, reflecting the first theme. Participant 4 stated, “When I was trusted to decide how to prioritize patient care, I felt like a real nurse. This trust helped me build confidence and learn faster.” Participant 9, however, shared a contrasting experience: “We are often micromanaged. It feels like we are just following orders rather than learning to think for ourselves.” These accounts underscore the variability in autonomy support across clinical environments and highlight the role of mentorship in fostering independence.

The second theme, Mentorship as a Mediator of Competence Development, emerged prominently in participants’ accounts. Students often mentioned the quality of mentorship and hands-on opportunities. Participant 7 explained, “Good mentors make you feel capable, but when they are unavailable, it’s easy to doubt yourself.” Participant 12 elaborated, “When I successfully managed a complex case after being guided step-by-step, I realized how much I had grown.” These narratives align with the quantitative findings, which link competence to mentorship quality and academic preparation.

Relatedness was vividly described through students’ interactions with peers and staff. Participant 3 remarked, “Having supportive colleagues makes all the difference. We shared responsibilities and encouraged each other.” Conversely, Participant 11 noted, “Without connections, clinical work feels isolating and mechanical.” The qualitative insights deepen the understanding of the SEM results, illustrating how team dynamics and perceived gender-linked differences shape relatedness.

Influence of Clinical Environments

The PLS-SEM results for the “Influence of Clinical Environments” demonstrated an excellent model fit, supporting the proposed pathways linking clinical environment factors to self-determination dimensions. The NFI was 0.94, surpassing the threshold of 0.90, indicating a very good fit of the model to the data. The SRMR was 0.043, falling within the acceptable range (≤ 0.08), suggesting a close approximation of the model to the observed relationships. CR values for all constructs exceeded 0.80, and AVE values ranged from 0.53 to 0.63, confirming convergent validity. HTMT values were all below 0.85, supporting discriminant validity. These fit indices collectively support the proposed structural pathways, highlighting the significant associations among autonomy-supportive supervision ($\beta = 0.47$, $p < 0.001$), structured mentorship ($\beta = 0.44$, $p < 0.001$), and team cohesion ($\beta = 0.36$, $p < 0.01$) in shaping the self-determination of pre-clinical nursing students. The fit statistics support the credibility of these findings, pointing to the importance of examining clinical environment factors in relation to students’ autonomy, competence, and relatedness.

Table 4

PLS-SEM Quality Indicators for Influence of Clinical Environments

Fit Index	Value	Threshold for Acceptability	Interpretation
Normed Fit Index (NFI)	0.94	≥ 0.90	Excellent fit
Average Variance Extracted (AVE)	0.58	> 0.50	Adequate convergent validity
Standardized Root Mean Square Residual (SRMR)	0.043	≤ 0.08	Good fit
Heterotrait-Monotrait Ratio (HTMT)	0.76	< 0.85	Discriminant validity confirmed
Composite Reliability (CR)	0.86	> 0.70	Acceptable composite reliability

Autonomy-supportive supervision emerged as the strongest association with self-determination. Participants with access to supportive supervisors reported higher confidence and satisfaction, as reflected in the quantitative relationship between supervision and autonomy.

For example, Participant 6 reflected, “Supervisors who trust us and give constructive feedback create a positive learning environment. Even mistakes become opportunities.” In contrast, Participant 10 shared a negative experience: “Supervisors who criticize without guidance make you feel small and unmotivated.”

These differing accounts underline the variability in supervisory approaches and their impact on students' psychological needs. Quantitatively, this variability aligns with the moderate effect size found between structured mentorship programs and self-determination ($\beta = 0.44$, $p < 0.001$).

The structured mentorship programs were also pivotal, particularly in developing competence. Participant 7 elaborated, “When my mentor explained clinical procedures step-by-step, I felt more competent and confident to perform independently.” This aligns with the findings that mentorship programs significantly influenced competence, as shown in PLS-SEM pathways.

Furthermore, structured mentorship provided a sense of security that facilitated better integration into clinical teams. This psychological security appears to stem from students' perception that they had a reliable guide they could approach with questions, uncertainties, and errors — reducing the fear of judgment and enabling more active participation in team-based care. Participant 12 commented, “Good mentors not only teach us technical skills but also help us navigate the interpersonal challenges of hospital environments.” These insights resonate with the PLS-SEM results, which identified mentorship and team cohesion as significant contributors to relatedness ($\beta = 0.36$, $p < 0.01$). Relatedness, in turn, was significantly associated with gender ($\beta = 0.31$, $p < 0.05$), with female participants reporting higher perceived levels of support and collaboration within their teams. This pattern may reflect contextual and socialization factors within Indonesian clinical training settings, and warrants further investigation rather than a definitive attribution to gender-linked traits.

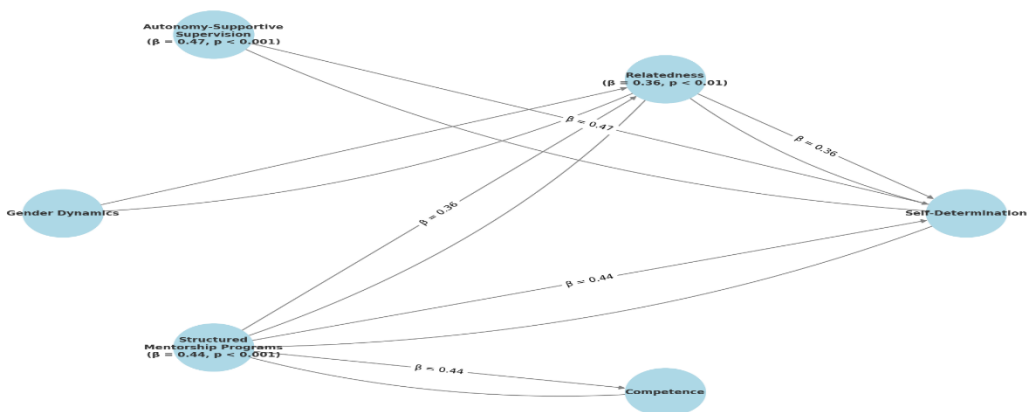


Figure 2. PLS-SEM Pathways Mapping Key Factors Influencing Self-Determination

A visual representation of these relationships is shown in Figure 2, which maps the PLS-SEM pathways and highlights the interplay of these key factors in influencing self-determination.

Perceived Supports for Enhancing Self-Determination

The integration of findings revealed that autonomy-supportive supervision, structured mentorship programs, and cohesive team dynamics are critical perceived supports for enhancing self-determination among pre-clinical nursing students. Quantitatively, autonomy-supportive supervision demonstrated a significant direct effect on overall self-determination ($\beta = 0.47$, $p < 0.001$). Qualitatively, students shared how constructive feedback and trust from supervisors empowered them to take initiative. Participant 15 encapsulated this, stating, “When you are supported and valued, you want to give your best. It transforms the entire experience.” Conversely, the absence of supportive supervision led to feelings of frustration and stagnation, as described by Participant 9: “It’s hard to stay motivated when supervisors don’t involve you in decisions or acknowledge your efforts.”

The PLS-SEM analysis for the “Perceived Supports for Enhancing Self-Determination” section demonstrated an acceptable model fit, indicating alignment between the hypothesized structural model and the observed data. The NFI was 0.95, exceeding the standard threshold of 0.90, suggesting an excellent model fit. The SRMR was 0.038, well within the ideal range of ≤ 0.08 , reflecting a close fit to the data. CR values for all constructs exceeded 0.83, and AVE values ranged from 0.55 to 0.65, confirming convergent validity. HTMT values were all below 0.85, confirming discriminant validity. The analysis underscored the significant associations among autonomy-supportive supervision ($\beta = 0.47$, $p < 0.001$), structured mentorship ($\beta = 0.44$, $p < 0.001$), and cohesive team dynamics ($\beta = 0.36$, $p < 0.01$) in relation to self-determination. These results indicate that the identified perceived supports were consistently associated with students’ engagement and readiness for clinical practice.

Table 5

PLS-SEM Quality Indicators for Perceived Supports for Enhancing Self-Determination

Fit Index	Value	Threshold for Acceptability	Interpretation
Normed Fit Index (NFI)	0.95	≥ 0.90	Excellent fit
Average Variance Extracted (AVE)	0.60	> 0.50	Adequate convergent validity
Standardized Root Mean Square Residual (SRMR)	0.038	≤ 0.08	Good fit
Heterotrait-Monotrait Ratio (HTMT)	0.74	< 0.85	Discriminant validity confirmed
Composite Reliability (CR)	0.87	> 0.70	Acceptable composite reliability

Participant 12 elaborated, “Good mentors not only teach us the technical aspects but also provide emotional and professional guidance, making us feel more prepared for real-world challenges.” These findings underscore the dual role of mentorship in building technical skills and confidence while addressing students’ emotional and professional needs. Technically, mentors provide structured guidance through demonstrations, step-by-step supervision, and corrective feedback that helps students master clinical procedures. Professionally and emotionally, mentors serve as role models who normalize uncertainty, validate students’ progress, and buffer the anxieties that arise in high-stakes hospital environments. This dual function is particularly critical during the pre-clinical phase, when students lack sufficient experience to self-regulate their confidence independently (Jackson, 2020).

Team cohesion was another significant contributor to relatedness and self-determination, with quantitative analysis highlighting its importance ($\beta = 0.36$, $p < 0.01$). Participant 3 shared, “When we work together as a team, the learning environment becomes much less stressful, and we can lean on each other.” Female participants, in particular, reported stronger perceptions of team support, which may reflect cultural dynamics that influence collaboration in Indonesian clinical settings. In collectivist cultural contexts such as Indonesia, gender-linked socialization patterns can shape interpersonal communication styles, with female students potentially benefiting from more nurturing peer networks within team environments (Crary, 2016; Wong et al., 2022). These observed differences should, however, be interpreted as contextually situated rather than as inherent or universal gender traits. Participant 11 noted, “In teams where everyone contributes equally, you feel like you truly belong. It’s motivating to be part of a group that works towards shared goals.”

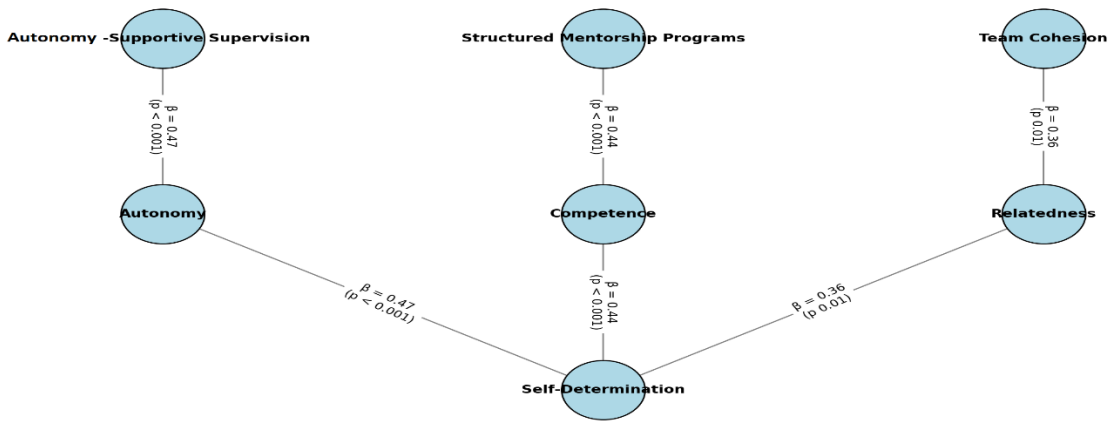


Figure 3. PLS-SEM Pathway for Perceived Supports and Their Contribution to Self-Determination

Figure 3 provides a visual summary of the PLS-SEM pathways for these perceived supports and their contributions to self-determination. The diagram emphasizes how targeted interventions in these areas can create a more empowering clinical learning environment.

Overall, the findings indicate that structural interventions tailored to autonomy, competence, and relatedness can significantly enhance the clinical learning experience for nursing students. By addressing both individual needs and systemic factors, these strategies contribute to a holistic approach for fostering self-determination in healthcare education.

Discussion

The findings of this study reveal critical insights into the self-determination needs of pre-clinical nursing students during hospital training programs, shedding light on the interplay between autonomy, competence, and relatedness. The quantitative results, complemented by qualitative data, provide a nuanced understanding of how clinical environments shape self-determination. These findings align with and expand upon the existing literature on self-determination theory (SDT), revealing both consistencies and unique contributions to the field of health professional education (Mukhtar & Naz, 2021; Waty et al., 2023).

In line with previous studies, the results underscore the importance of autonomy-supportive environments in clinical education (Bilkes, 2023; Jardine-Garvey, 2023; Reeve & Cheon, 2021; Regaira-Martínez et al., 2023; Zhou et al., 2023). The strong association between prior clinical experience and autonomy suggests that hands-on exposure is significantly associated with students' decision-making abilities and professional confidence. Experiential engagement in real clinical settings enables students to apply theoretical knowledge in context, receive immediate feedback on their clinical reasoning, and progressively internalize professional standards. These repeated, authentic practice cycles appear to strengthen both the cognitive frameworks and the self-efficacy required for autonomous clinical judgment, consistent with the emphasis on experiential engagement found in nursing education literature (Bussard, 2015; Wright & Scardaville, 2021). This finding supports the central proposition of SDT that autonomy promotes intrinsic motivation and facilitates deeper engagement in learning processes (Ryan & Deci, 2000). In the context of health education, providing opportunities for active participation in clinical decision-making may strengthen students' sense of ownership over their learning. However, qualitative findings revealed inconsistencies in autonomy support, with some students reporting experiences of micromanagement that limited their ability to make independent judgments. Such practices reflect the hierarchical structure often present in clinical environments, as also highlighted by Regaira-Martínez et al., (2023) and Bilkes (2023). These dynamics suggest that educational reforms in clinical supervision are needed to balance necessary guidance with opportunities for independent clinical reasoning. Specifically, supervisors may benefit from training in

autonomy-supportive approaches that shift from directive control toward facilitative coaching, allowing students to make graduated decisions while maintaining appropriate oversight (Herlina et al., 2021; Sarnkhaowkhom & Suwathanpornkul, 2022). Restructuring clinical supervision protocols to explicitly protect space for student-initiated decision-making could address the tension between institutional safety requirements and students' developmental needs for independence.

Competence also emerged as a crucial determinant of students' self-determination. The results indicate that academic performance significantly predicts students' perceptions of their clinical capabilities. This finding is consistent with Wright and Scardaville (2021), who demonstrated that competence is closely associated with effective problem-solving and clinical performance among health professional students. Nevertheless, the qualitative findings emphasize that competence development extends beyond individual academic preparation. Students frequently highlighted the role of mentorship in shaping their confidence and readiness to perform clinical procedures. Structured guidance, demonstrations, and opportunities for supervised practice were perceived as essential components of competence development, reinforcing previous findings by Jackson (2020) and Coleman et al. (2024). These findings highlight the importance of mentorship as an educational mechanism that bridges theoretical knowledge and practical application within clinical settings. Consequently, competence development should be viewed as a collaborative process involving both students' individual efforts and supportive educational structures.

Relatedness, although less frequently examined in clinical education research, emerged as another significant predictor of self-determination in this study. The quantitative findings support the argument of Al-Hoorie et al., (2022) that strong interpersonal relationships enhance motivation, persistence, and emotional resilience among learners. Within the clinical environment, relatedness manifests through supportive interactions with peers, mentors, and healthcare teams. Gender differences in relatedness were also observed, with female students reporting stronger perceptions of collaboration and social support (Zahra et al., 2022; Alwi et al., 2024). These patterns may reflect broader social and cultural dynamics within clinical education environments and align with previous findings by Crary (2016) and Wong et al., (2022), who emphasized the role of inclusive interpersonal relationships in shaping effective learning environments. The qualitative data further illustrated that positive team dynamics and mutual encouragement contributed to students' sense of belonging and psychological safety during clinical practice. When team members acknowledged each other's efforts, shared clinical responsibilities, and responded to mistakes with constructive rather than punitive feedback, students reported feeling more comfortable engaging in learning behaviors, asking questions, and admitting uncertainty. This psychologically safe environment reduces the emotional burden of clinical exposure and fosters conditions under which relatedness, as a core SDT need, can be genuinely satisfied (Al-Hoorie et al., 2022). Conversely, strained relationships with supervisors or peers were reported as barriers to effective learning, supporting earlier observations by Jardine-Garvey (2023).

Another important contribution of this study lies in its focus on the cultural context of Indonesian nursing education. Cultural norms may influence supervisory relationships, communication patterns, and students' perceptions of authority within clinical environments. In the Indonesian context, hierarchical power structures and strong deference norms toward authority figures are recognised features of professional and educational relationships that shape how students communicate with supervisors. These cultural expectations can create barriers to open communication between students and supervisors, leading students to suppress questions or concerns to avoid appearing incompetent or disrespectful (Ali & Zeb, 2023; Hidayati et al., 2023). Consequently, the expression and satisfaction of psychological needs — particularly autonomy and relatedness — may be shaped not only by institutional structures but also by culturally embedded relational norms that mediate how supervision is experienced. While SDT provides a widely applicable theoretical framework, its implementation within diverse cultural contexts remains insufficiently explored. By examining self-determination within Indonesian clinical education settings, this study contributes to a more culturally contextualized understanding of motivation and learning in health professional education. This

contribution responds to calls by Deci and Ryan (2012) for broader cross-cultural research that examines how psychological needs operate within different educational and social contexts.

Methodologically, this study also contributes to the literature by applying partial least squares structural equation modeling (PLS-SEM) to analyze the complex relationships between clinical environment factors and self-determination dimensions. PLS-SEM enables the simultaneous examination of multiple interrelated variables, providing a comprehensive understanding of the factors that influence students' autonomy, competence, and relatedness. The integration of qualitative findings further strengthens the interpretation of the statistical results, offering contextual explanations for observed patterns in the data. This data-method triangulation approach, combining statistical modeling with qualitative insights, is consistent with convergent mixed-methods designs advocated by Creswell and Clark (2017) and reflects a growing methodological trend in health professional education research that integrates quantitative pattern identification with qualitative depth to capture the complexity of clinical learning experiences.

From a health education perspective, the findings highlight the importance of designing clinical learning environments that actively support students' psychological needs. Educational strategies such as reflective supervision, structured mentorship programs, and collaborative learning opportunities may enhance students' engagement and professional identity development. By fostering supportive learning environments, healthcare institutions can contribute to the development of motivated and confident future nurses who are better prepared to navigate the challenges of professional practice. Practically, this may involve establishing mentorship frameworks with clear role expectations for clinical preceptors, integrating regular team-based debriefing sessions into training schedules, and adopting supervision models that progressively extend students' decision-making latitude as competence develops. Institutionally, policies that protect students from excessive workloads and that require supervisors to receive training in autonomy-supportive pedagogy can create systemic conditions under which self-determination flourishes, ultimately improving graduate readiness, retention, and patient care quality.

Overall, this study advances the understanding of self-determination in clinical education by revealing both universal principles and culturally specific nuances. The findings emphasize the need for autonomy-supportive supervision, high-quality mentorship, and cohesive team dynamics to foster self-determination among pre-clinical nursing students. These insights contribute to the development of evidence-based strategies for improving clinical education practices and strengthening the preparation of nursing students for professional healthcare roles.

Conclusion

This study reveals critical insights into the self-determination needs of pre-clinical nursing students during hospital training programs. Findings indicate that autonomy, competence, and relatedness significantly influence students' clinical learning experiences and professional readiness. Autonomy was enhanced by prior clinical exposure, but inconsistent supervisory practices often hindered decision-making. Competence emerged as a function of academic preparation and high-quality mentorship, emphasizing the importance of hands-on guidance in clinical settings. Relatedness was shaped by team dynamics and gender-specific interactions, reflecting the role of supportive relationships in fostering emotional resilience and collaboration. The study emphasizes autonomy-supportive supervision, structured mentorship programs, and cohesive team dynamics as perceived supports associated with enhanced self-determination in clinical education. By addressing systemic barriers and tailoring interventions to meet students' psychological needs, these findings contribute to a more inclusive and effective approach to nursing education. Furthermore, the cultural context of Indonesian nursing education highlights the need for culturally responsive strategies, broadening the application of self-determination theory in diverse educational settings. Ultimately, this research advances the understanding of self-determination in clinical education and provides actionable insights for educators,

mentors, and policymakers seeking to optimize nursing students' motivation, engagement, and professional competence.

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Developing Unified, Ethics-Centered Standards for Applied Media Production: Evidence from Palestinian Universities

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Amid rapid digital transformation, higher education lacks validated, context-sensitive frameworks for evaluating applied media outputs, creating a critical risk of misalignment between academic curricula, professional ethics, and labor-market expectations. This study examines the acceptance among Palestinian university academics of a set of expert-derived criteria for evaluating applied courses, graduation projects, and student films. A convergent mixed-methods design was employed, surveying 40 academics and conducting three focus groups with 14 media-training experts; the survey instrument was developed directly from the qualitative findings. Results from descriptive and inferential statistics, integrated with thematic analysis, revealed strong consensus on the importance of ethical standards, narrative and aesthetic craftsmanship, and fairness. Conversely, confidence was comparatively lower for platform-specific and rapidly evolving technical indicators. Qualitatively, experts reframed technical skill as an ethical narrative practice and emphasized institutional accountability through supervised clearance protocols. Overall, the results indicate the feasibility of employing a shared, multidimensional framework focused on ethical evaluation, aiming to improve transparency, alignment with professional practices, and sensitivity to the educational context in applied media instruction.

Keywords: media evaluation criteria, applied media production, ethical accountability, digital literacy, Palestinian higher education

Higher education institutions are now required to ensure that the graduates they produce can meet various demands of professionalism, technology, and ethics. This requirement is particularly evident in media education, where students are supposed to write journalistic pieces, advertisements, and movies that demonstrate professionalism, technology, and ethical considerations. Under these circumstances, colleges are expected to revise testing procedures to ensure technical knowledge and ethical behavior, critical judgment, and professional relevance to student work (Buckingham, 2015; Kirkwood & Price, 2014).

This is further complicated by digital transformation, where research consistently suggests a gap between media students' learning and the content-making skills needed by the modern media industry: there is a gap in technological competences regarding digital workflows, remote production, and AI-based content creation (Bond et al., 2021; Zawacki-Richter et al., 2019). Moreover, recent studies also reveal that the development of generative AI is impacting journalism, media production, and higher education courses, forcing institutions to rethink their methods of production and evaluation (Pavlik, 2023). Although international standards emphasize linking teaching to the national context and latest technology, especially those in media and information literacy (Livingstone, 2004; Wuyckens et al., 2022), only limited studies have explored how students in developing countries assess applied media work under these conditions. In addition, recent systematic reviews also reveal that the development of digitalization in higher education becomes

contingent upon the need for institutions to incorporate digital competencies, ethical sensibilities, and adaptive pedagogy to respond to evolving technology (Fariás-Gaytán et al., 2023).

While international research has recently grown on media literacy, digital instruction, and evaluation innovation, there is a paucity of empirical and theoretical research on the perception, design, and practice of applied media evaluation in Palestinian universities. The majority of the literature is concentrated on competence in media or development in general without offering any specific models that can relate to evaluation and are inclusive of issues such as ethics, fidelity, and administration. This is especially applicable to the case of Palestine because the need for sound and dependable evaluation criteria is affected by many different factors including politics and resource constraints.

Following the discussion about media literacy, professional ethics, and technology-enhanced learning, this research was conducted through the adoption of a mixed-methods approach, which is an approach that makes use of quantitative and qualitative measurements to assess the academic consensus and understand the more complicated evaluations that can be made when applying media education (Kirkwood & Price, 2014). The research question posed by this paper is the following: To what extent do academics at Palestinian universities agree with the expert-derived criteria proposed for evaluating applied media education, graduation projects, and student films?

Three major contributions stand out from this study. First, media education literature has been enhanced with an integration of the concepts of media literacy, digital literacy, and technology-enabled learning within an evaluation framework consistent with the outputs of applied media; secondly, it represents the first attempt at empirical investigation into the criteria developed by experts in Palestinian universities; finally, a scientifically sound approach to testing has been achieved, which guarantees both curricular and occupational alignment. In combination with practitioner insights and academic validation, this paper proposes a contextual, digital-age-specific methodology for assessing applied media work.

Literature Review

The development of digital media ecosystems and smart production systems has fundamentally changed media education by shifting the focus from traditional skills training to models combining technology use, multimodal design, and critical interpretation (Buckingham, 2013; Burn, 2016). The definition of applied media production used in this study is that of student-produced professional work undertaken in an educational context, ranging from journalism and promotions through audio production and short films, all of which are analyzed as examples of storytelling, artistry, and technique.

However, research on technology-enhanced learning shows that innovation is still conceptually fragmented, causing uncertainty in what constitutes meaningful learning improvement in rapidly changing technological contexts (Kirkwood & Price, 2014). Here technology-enhanced learning means a digital tool with tangible learning gains rather than new technologies. This confusion is difficult to overcome when developing effective assessment criteria for hybrid media practices and is reinforced by AI-driven production practices that undermine established notions of originality, authorship, and professional competence (Schneider et al., 2020). As recent research on journalism and media education also suggests, AI has not only changed how creativity is done but also raised concerns about authorship, creativity, evaluation, and professionalism (Pavlik, 2023; Bender, 2023). AI-driven production is understood to be an algorithmic synthesis or modification of media content that raises questions of student authorship, imagination, and responsibility. Recent studies have raised additional concerns about ethical considerations, effective communication, and incorporating such AI tools into educational contexts (Matsiola et al., 2024).

In this dynamic context, media literacy literature emphasizes that effective navigation through complex media systems requires cognitive, critical, and ethical skills (Livingstone, 2004; Potter, 2010). In practice, media literacy is understood in terms of “a plurality of categories”: critical thinking about media content; awareness of representation and ideology; and ethical production and dissemination. Competent practitioners must integrate technical, analytical, and ethical dimensions, as the boundaries between media,

information, and digital literacy become blurred (Wuyckens et al., 2022). Recent studies have shown that digital literacy is now highly correlated with newly developed skills in the field of artificial intelligence, especially in education settings where users must analyze, understand, and use AI technologies responsibly (Sergeeva et al., 2025). Here, digital literacy is defined as the ability to use digital platforms in order to produce and distribute content while integrating logics within platforms, data practices, audiences, and risk; information literacy refers to the ability to verify information, to validate sources, and to ensure accuracy particularly in journalism and documentary contexts.

Nevertheless, the problem of digital literacy remains a debate when power relations, ideology, and critical analysis are neglected as a component of applied media work (Buckingham, 2015). Finally, Masterman (2018) conceptualized media competence as a form of socially responsible production, implying that evaluation should assess the extent to which students integrate theory, ethics, and professional practice. Ethics, in this study, means the degree of accuracy, objectivity, privacy, knowledge of the law, minimization of harm, and compassion toward participants, audiences, and groups represented, particularly in politically and culturally sensitive situations. According to recent findings regarding digital ethics, an individual's ethical skills in digitized contexts involve more than adhering to rules but encompass awareness of the impact of algorithms, responsibility in content creation, protection of personal information, and the social implications of new technologies (Händel et al., 2025).

Based on these differences within the theory, research carried out in this area shows that the current rubrics do not reflect the multimodal nature and creativity as well as the ethics involved in media application practices (Villarroel et al., 2018). The rubric under discussion refers to a set of performance standards, which serves as the basis for evaluation and feedback, while evaluation criteria mean specific ethical, narrative, technical, and equitable criteria that are taken into account when evaluating the results produced by media. Although the scoring scales are designed to increase transparency, they cannot adequately represent higher-order skills such as creativity, critical thinking, and ethics (Sparks et al., 2014; Panadero & Jonsson, 2013; Dawson, 2017). According to recent literature on authentic assessment, a major deficiency has been recognized between the current methods of evaluation and the complexity associated with evaluating professional competencies (Zhan et al., 2025). This problem becomes evident when dealing with media because technical skill, storytelling, and ethics cannot be separated from one another.

Further, inconsistency among assessment tools, learning goals, and leadership within the organization can negatively affect pedagogical coherence (Leithwood et al., 2008). For this research, fairness involves consistent assessments regardless of the type of outputs or the identity of the students, whereas logical consistency involves consistency among the learning goals, assessment criteria, and assessments.

Studies on institutional adaptation have shown that there are still gaps between the curricula and the labor-market needs in the media industry. To some extent, the universities are not equipped with the infrastructure, training, and methodological flexibility needed to keep up with the ever-changing technologies (Kirkwood & Price, 2014; Burn, 2016). Labor-market alignment in this case translates to what extent professional expectations for employability, such as ethical compliance, workflow competency, and audience-oriented communication, are assessed against standards of evaluation. Research on educational development emphasizes that substantial pedagogical innovation relies on institutional agency, resources, and leadership (Kabeer, 1999; Leithwood et al., 2008), but still the faculty and students are finding it difficult to adjust the evaluation methods to the current production workflows (Potter, 2010; Buckingham, 2015). The multimedia learning research of Mayer emphasizes that the proper control of new technologies necessitates an entire instructional redesign and not the adoption of the tools alone (Mayer, 2014). This suggests that assessment strategies should not include “continuous skills” and “tool-specific skills,” especially given that platform options, software features, and algorithmic inclinations are more dynamic than the academic program.

Theoretically, Craig's (1999) model of communication as an integration of rhetorical, socio-cultural, critical, and phenomenological traditions underscores the need for evaluation systems that reflect epistemological plurality. In this study, “narrative integrity” refers to coherence in structure, meaning-making,

spacing, and audience comprehension, while “multimodal craftsmanship” denotes the integrated quality of image, sound, editing, composition, and design in producing meaning. As a result, applied media work like films, journalistic texts, and promotional material should be assessed not only for technical competence but also for narrative strategy, cultural context, ethical positioning, and audience orientation. “Platform-specific indicators” indicate measures related to specific digital platforms or rapidly changing production environments such as format optimization, platform conventions, analytics-based editing and periodic re-calibration of tool-based workflows.

However, existing frameworks provide little guidance in implementing such complex evaluations, particularly in the case of Palestine, where institutional constraints make assessment even more challenging. The evaluation process is therefore closely linked to risk management and accountability in confined environments where decisions regarding publication, distribution or public display might require oversight and clearance. Also, although applied courses and graduate programs form the foundations of students’ professional identities, little is known in the literature about what students are thinking, understanding, and employing of discipline specific assessment criteria. There is still a short supply of authentic, contextually relevant assessment practices for applied media work in higher education, particularly at developing and conflicted institutions like Palestinian universities where inconsistent grading, sloppy alignment of curriculum and labor markets, and limited student readiness for digital media environments, continue to impede consensus on assessment practices (Trilling & Fadel, 2009).

Within these areas lie several considerable gaps: largely unaddressed theories of media literacy; assessment tools that neglect modes of communication and ethical concerns; broad frameworks that overlook the impact of deep context; and a plethora of single-method studies unable to capture the nuanced logic of the assessor. Each of these is complicated in the Palestinian context by the impact of geopolitics on media education. However, media education in Palestinian universities faces additional challenges because of issues that may arise due to the restrictions related to movement and access to technological facilities, and increased attention in terms of public media productions’ criticism, which can affect both the development and evaluation of such projects as well as the very process of evaluation itself, especially since there are projects that need approval before being released into circulation. Thus, students and staff involved in media education will have to face even greater ethical challenges when dealing with media evaluation issues.

The phrase context-sensitive assessment refers in this research to procedures that are theoretically grounded yet adaptable to local institutions, political pressures, and infrastructure needs while instilling ethical confidence and transparency. These gaps require a mixed-methods strategy capable of validating expert-defined criteria and delivering contextual assessments of the applied media artifacts. While research on digital literacy, digital ethics, authentic assessments, and AI-based learning practices is rapidly increasing, comparatively little effort has been devoted to combining these various aspects in one holistic evaluation process of applied media productions in challenging political conditions within resource-poor contexts in higher education institutions (Farías-Gaytán et al., 2023; Händel et al., 2025; Pavlik, 2023; Zhan et al., 2025). Collectively, the results of the reviewed research indicate that media literacy provides a basis for critically and communicatively assessing media content; that it is extended by digital literacy into today’s technology-rich environment; and that digital ethics provides an element of responsible, transparent, and accountable behavior in the use of technology. Thus, authentic assessment frameworks represent the methodological means by which these competencies may be assessed. Therefore, this study conceptualizes applied media evaluation as the integration of media literacy, digital literacy, ethical responsibilities, and authentic assessment practices.

Method

Research Design

This study employed an exploratory convergent mixed-methods design with both quantitative and qualitative analyses to investigate the acceptance of expert-conceptual measures of applied media production by academics in Palestinian universities. Specifically, this study used a convergent parallel mixed-methods research design in which the qualitative and quantitative strands of the study were carried out within the same overall phase of the research process, analyzed separately, and then combined at the interpretation stage. The qualitative strand preceded finalization of the

instrument to inform the construction of its items whereas the quantitative strand tested the level of acceptance and internal coherence of the suggested criteria among academics. Integration occurred through side-by-side comparison and thematic and statistical convergence analysis to identify areas of agreement, complementarity, and divergence.

The study consisted of four phases: (1) focus groups to identify evaluation dimensions and elicit draft evaluation dimensions, (2) constructing and conducting expert panel review of a structured survey instrument informed by the qualitative data, (3) collecting and statistically validating the survey data to confirm a multidimensional evaluation model, and (4) integrating the qualitative and quantitative findings to interpret and illustrate a comprehensive ethical evaluation schema. Figure 1 shows the underlying structure of the research design, which is more suited to the topic since there are several dimensions in evaluating media, including ethics, technology, storytelling, and institutional considerations that cannot be fully captured through a single method. Both quantitative and qualitative strands were analyzed separately and then integrated during interpretation to identify areas of convergence and divergence in assessment reasoning (Al-Fraihat et al., 2020).

Participants and Sampling

As far as the quantitative aspect is concerned, all the instructors who have been teaching in the field of media at Palestinian universities have been surveyed. A total of ninety faculty members were selected by utilizing the census research design where $N = 90$. In addition, forty participants gave valid responses in relation to their departments, areas of specialization, and levels of experience. This number was deemed appropriate in terms of statistical validity since a small specialized sample size was used in the study. Moreover, this sample comprised instructors working in nine universities within the West Bank and Gaza Strip. In these universities, both private and governmental institutions have been considered. The sample contained instructors of different genders, that is, seventy-five percent males and twenty-five percent females. The level of academic rank and years of teaching experience ranged from assistant, associate, and full professors and from less than five and more than fifteen years. More than one-third of the sample was made up of senior lecturers. In addition, the instructors were specialized in digital/new media, journalism, public relations, radio/television, media technology, and interdisciplinary media subjects.

Qualitative data collection was done using three semi-structured focus groups consisting of 14 media trainers. The media trainers chosen for the study had many years of experience in assessing and supervising projects. The trainers include media supervisors, film makers, and journalism instructors. The qualitative participants represented a variety of professional roles, such as media producers, journalists, and documentary filmmakers. They came from a variety of institutions and had varied years of experience and specializations, including documentary film production, investigative journalism, television, and new media. Participants' professional experiences ranged from professors to practicing professionals, offering a breadth of experience and credibility to the criteria that emerged from experts. The inclusion of qualified practitioners is in keeping with the recommendations of studies on multimodal, creative assessment (Schneider, 2017; Sparks et al., 2014).

Though the sample size was small, it comprised a significant proportion of the unique group of media academics in Palestinian universities and thus was deemed sufficient for conducting this initial research study. Since there were only a few media academics working at Palestinian universities, a census method of sampling was used in an attempt to cover the entire population. Nonetheless, the results obtained need to be cautiously interpreted, especially where differences between sub-groups in terms of universities, disciplines, and years of teaching experience are concerned.

Characteristics of the Study Sample

The quantitative phase included forty faculty members coming from nine Palestinian universities, all from different institutional contexts, different disciplinary domains and different levels of teaching experience. As shown in Table 1, three quarters of the sample was male and one quarter was female. Experience was evenly distributed, with the majority reporting over fifteen years of teaching experience, and a high percentage indicating a high proportion of senior academics. In addition to public relations, radio and television, media

technology, and related specializations, digital and new media and journalism were also on the list. This distribution shows the structure of media programs in Palestinian higher education and provides a basis for an interpretive understanding of assessment consensus across institutions.

Table 1
General Characteristics of the Sample

Variable	Frequency	Percentage (%)
Gender		
Male	30	75.0
Female	10	25.0
Years of Teaching Experience		
Less than 5 years	9	22.5
5–<10 years	10	25.0
10–<15 years	6	15.0
More than 15 years	15	37.5
Specialization		
Digital / New Media	14	35.0
Journalism and Media	10	25.0
Public Relations	5	12.5
Radio and Television	4	10.0
Media Technology	4	10.0
Other	3	7.5
University		
Kadoorie University	8	20.0
Arab American University	6	15.0
Gaza Universities	6	15.0
Al-Quds Open University	5	12.5
Hebron University	4	10.0
An-Najah National University	3	7.5
Bethlehem University	3	7.5
Birzeit University	3	7.5
Al-Asriyya University College	2	5.0
Total	40	100.0

Instrument Development

The qualitative data were first collected and then used to inform the quantitative instrument. Focus group conversations were audio-recorded, transcribed verbatim, and examined by thematic analysis using open, axial, and selective coding procedures. The emerging themes of ethical accountability, narrative coherence, technical craftsmanship, fairness, and institutional responsibility were incorporated into measurable survey items.

In this process, a 32-item questionnaire was developed to implement the assessment criteria identified by the qualitative analysis. The assessment instrument was designed to address multiple areas of applied media assessment, including general standards of quality, ethics and analytical depth; the criteria of film-specific quality of cinematography, narrative coherence, and editing quality; the quality criteria for graduation projects and applied outputs of originality, audience impact, technological integration, and conformity with labor market expectations; standards for testing applied courses of professional conventions, production principles, and course-output alignment; and metrics of fairness and logical coherence across media output types and educational contexts.

For consistency and clarity of content, four of the high-ranking media education and assessment professors reviewed the questionnaire. Minor revisions were made to improve wording, conceptual alignment, and instructional coherence as directed by the principles of a transparent, engaged assessment design (Mayer, 2014).

Quantitative Data Analysis

The survey items were developed directly from the qualitative research phase through a coding to item translation process. Through open, axial, and selective coding of the focus-group transcripts, several core themes (such as ethical accountability, narrative consistency, multimodal competence, and institutional accountability) have been derived and converted into concrete indicators. For each qualitative theme, multiple statements were developed to reflect the assessment practices identified in the qualitative data, while ensuring that the items remained faithful to the language and meaning of the participants. Overlapping codes, clarified ambiguous language, and removed redundant indicators to refine the constructs.

Prior to mass distribution, the draft instrument was piloted with six media studies faculty (not members of the sampled population) to check for clarity and appropriateness of wording, relevance and internal coherence of items, and the approximate completion time. A few minor changes were made to improve phrasing, avoid duplication, and better match qualitative constructs with quantitative dimensions of measurement. Data generated from the pilot participants were not retained for use in the final analysis.

Quantitative statistics including mean, standard deviations, Pearson correlation coefficients, independent-sample t-tests, and one-way ANOVA were applied to the quantitative data. These analyses were conducted to test acceptance, to test correlations across assessment dimensions, and to analyze demographic variability.

Internal Consistency Validity

In the instrument development process, the validity of internal consistency was examined to ensure that the units of data constructed from qualitative codes into survey items were representative of the dimension they were intended to measure. Since the instrument was developed by translating themes derived from experts into indicators that could be measured, correlations between items and dimensions were evaluated to determine the extent to which each item corresponded to the qualitative constructs from which they were derived.

Items were then re-examined for consistency at the level of the item and the correlation coefficients of the item-dimension relationship were obtained for all axes. This analysis also confirmed that each item adequately represented its intended construct.

Table 2
Internal Consistency Validity (Item-Dimension Correlations)

Dimension / Item	R	p
Axis 1: General Questions		
Accuracy of information	0.75	<.001
Objectivity assessment	0.75	<.001
Legal aspects	0.87	<.001
Professional ethics	0.55	<.001
Depth of analysis	0.81	<.001
Managing field challenges	0.82	<.001
Axis 2: Film Evaluation		
Cinematography quality	0.70	<.001
Visual aesthetics	0.64	<.001
Originality/creativity	0.50	<.001
Narrative pacing	0.62	<.001
Artistic coherence	0.83	<.001
Editing mastery/meaning	0.85	<.001
Editing innovation	0.83	<.001

Temporal synchronization	0.82	<.001
Axis 3: Graduation Projects & Applied Outputs		
Artistic–market balance	0.82	<.001
Audience impact	0.74	<.001
Modern technologies	0.66	<.001
Content–form harmony	0.85	<.001
Fairness across types	0.72	<.001
Originality/depth	0.73	<.001
Experimentation/innovation	0.83	<.001
Editing software	0.71	<.001
Axis 4: Applied Courses		
Journalistic forms/style	0.80	<.001
Persuasive elements	0.77	<.001
Audio/radio outputs	0.89	<.001
Professional standards	0.80	<.001
Design/production principles	0.85	<.001
Output–course alignment	0.86	<.001
Axis 5: Fairness & Logical Consistency		
Unified assessment	0.71	<.001
Standards clarity	0.77	<.001
Fairness across outputs	0.86	<.001
Tech-alignment adoption	0.82	<.001

All items had statistically significant correlations with their respective dimensions ($p < .001$), indicating strong internal consistency and appropriate construct alignment. These findings confirm that the quantitative structure retained fidelity to the qualitative thematic structure from which it was developed.

Construct Validity

The construct validity was assessed using correlations of dimension-total score to assess the contribution of each axis to the overall assessment framework.

Table 3
Construct Validity (Dimension-Total Correlations)

Dimension	r	p
Axis 1: General Questions	0.92	<.001
Axis 2: Film Evaluation	0.88	<.001
Axis 3: Graduation Projects & Applied Outputs	0.91	<.001
Axis 4: Evaluation of Applied Courses	0.89	<.001
Axis 5: Fairness & Logical Consistency	0.77	<.001

As the study had an exploratory nature, and since the sample size was small ($n=40$), exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were not statistically applicable to this data set. Literature on research methods suggests that much larger sample sizes are needed for consistent factor extraction and model estimation. Thus, construct validity was analyzed by using correlation between dimensions and totals, and reliability coefficients; this type of validation is well recognized when developing initial survey instruments. It is recommended to use larger sample sizes in future studies to conduct an EFA and CFA analysis.

The findings confirmed that all measures significantly correlated with the overall questionnaire score, demonstrating the coherence of the proposed assessment structure.

Reliability Analysis

Instrument reliability was compared with the values of Cronbach's alpha and split-half reliability coefficients.

Table 4

Reliability Coefficients

Dimension	No. of Items	Cronbach's α	Split-Half
Axis 1: General Questions	6	0.85	0.83
Axis 2: Film Evaluation	8	0.87	0.82
Axis 3: Graduation Projects & Applied Outputs	8	0.89	0.90
Axis 4: Evaluation of Applied Courses	6	0.90	0.91
Axis 5: Fairness & Logical Consistency	4	0.80	0.75
Total Questionnaire	32	0.96	0.91

Reliability coefficients surpassed accepted thresholds across all dimensions, representing strong internal consistency and measurement stability.

Response Scale Interpretation

The standard five-point Likert scale was used to measure agreement levels across items.

Table 5

Response Scale

Scale	Degree of Agreement	Interval Range	Relative Weight
1	Very Low	1.00–1.80	20%–36%
2	Low	>1.80–2.60	>36%–52%
3	Moderate	>2.60–3.40	>52%–68%
4	High	>3.40–4.20	>68%–84%
5	Very High	>4.20–5.00	>84%–100%

This scale was used to classify mean scores and relative weights in subsequent analyses.

Qualitative Data Analysis

Qualitative data were analyzed using open-coding for concepts, axial coding to link to categories, and selective coding to define the central themes. Reflective memos, peer debriefing and case by case analysis contributed to a more refined analysis.

Integration of Quantitative and Qualitative Strands

Integration took place at two levels, instrument development and interpretation. At the first level, the quantitative instrument which was the survey was developed through the qualitative data. Through the thematic analysis of the focus group transcripts, it was these themes of ethical responsibility, storytelling, design elements, equity, and school support that formed the basis of the survey. Several items were initially written for each theme to be sure to capture the full scope through the quantitative measures. These were then narrowed and refined to avoid overlap and ensure that the survey instrument reflected the logic of the qualitative findings instead of imposing new ideas.

Second, integration occurred in the interpretation stage through a side-by-side comparison strategy. Quantitative patterns such as mean scores, acceptance ratings, and correlations among dimensions were compared with the qualitative themes to look for convergence, complementarity, and divergence. For example, the high quantitative agreement in the importance of ethical and narrative dimensions was interpreted alongside the qualitative stories of their significance, including ethical clearance from a supervising body and writing a trustworthy story. The lower confidence, relatively, in some of the indicators related to the platforms was examined alongside qualitative descriptions of trepidation about using the fast-changing technology tools.

The integration phase involved linking quantitative data patterns with qualitative data themes that define convergence, complementarity and divergence. Thus, the model was united and the model was developed based on both quantitative acceptance and more formal, expertly taught pedagogical thinking. The

process facilitated integration of the two levels of analysis, making the proposed framework coherent instead of being a juxtaposition of semi-independent statistical validation and professional reasoning.

Validity, Reliability, and Ethical Considerations

Triangulation, expert validation, and audit-trail procedures were employed to confirm rigor. Ethics was followed, and all participants voluntarily agreed. Data were strictly confidential and anonymous.

Finally, a consideration of how professors were motivated to use the proposed criteria was based on the processes of acceptance of technology, especially perceived value and contextual fit, important factors driving this adoption of assessment systems (Venkatesh & Davis, 2000).

Results

This section begins with a description of the sample. Next, the results are presented beginning with descriptive statistics for each dimension of the research, followed by inferential statistics and finally the qualitative results. To avoid redundancy between methods and results, the findings are presented without interpretation which occurs in the Discussion section.

Overall Acceptance of Evaluative Dimensions

To provide a clear indication of academics’ appreciation of the proposed assessment approach, results are summarized by dimension rather than using multiple table items. Table 6 reports mean, standard deviation and relative weights of the evaluation components.

Table 6

Overall Acceptance of Evaluative Dimensions

Evaluative Dimension	Mean	SD	Relative Weight (%)
General Evaluation Criteria	4.10	0.58	82.1
Film Evaluation	4.19	0.55	83.9
Graduation Projects and Applied Outputs	4.12	0.60	82.4
Evaluation of Applied Courses	4.08	0.66	81.6
Fairness and Logical Consistency	4.18	0.63	83.5

The results show that acceptance is consistently high in all dimensions with mean scores of more than 4.0 on the five-point scale. The strongest support was observed for Film Evaluation and Fairness and Logical Consistency. Item-level findings supporting these patterns are presented in Appendix A, Tables A1–A5. The assessment of applied courses and the general criteria also met with strong agreement, although acceptance for aspects of rapidly changing formats and technologies was relatively low but nevertheless strong.

Qualitative Findings

The qualitative findings helped explain the quantitative trends by showing the logic of the instructional process in the academic assessments they make. Participants viewed ethical oversight as an integral component of media education rather than a procedural requirement. They described supervised processes, including staged reviews, ethical checklists, and prior approvals, as vital to the safety of students and schools, especially in politically charged situations. *“Accuracy, legality, and balance are not negotiable; I start each project with these checks before talking about technical details”* one supervisor reported (Participant A).

These technical and aesthetic judgments were repeatedly referred to as ethical narrative practices, rather than as purely artistic practices. They stressed that cinematography, editing, sound, and pacing were valued for their ability to convey meaning and build audience trust. A film teacher stated: *“Any technical error is not a typo; it breaks the story and destroys the viewer’s trust in the content they are watching”* (Participant C). This illustrates the reasons for technical criteria being so strongly supported when nested within narrative coherence rather than just tool proficiency.

The third theme that also stood out was the accountability of institutions, specifically in the form of public distribution of student work. The participant emphasized that a project outside of the gallery needs

permission, particularly when it is a politically or socially sensitive project. This concern was illustrated by Participant E, who stated: “*A film may be excellent, but it should not be shown to the public until the department approves it, because the institution bears responsibility for it.*” Such reasoning helps explain the strong quantitative support for the fairness and logical consistency indicators.

Finally, creativity was encouraged by all, but always anchored in ethical realism. Participants distinguished between meaningful innovation and superficial novelty, emphasizing sensitivity to local contexts, subjects, and communities. One documentary filmmaker stated, “creativity is not about fancy effects, it is about saying something new without destroying those you are representing” (Participant F). This notion also reflects the cautious acceptance of platform-specific and rapidly changing technical variables that is evident in the quantitative results.

Integration of Quantitative and Qualitative Findings

Both quantitative and qualitative data showed considerable agreement between participants. In the quantitative analysis, participants strongly supported the dimensions of ethics, narrative integrity, craftsmanship, and fairness as important factors for assessment. Similarly, in qualitative data, experts confirmed the importance of these factors through their focus on ethics, trust, oversight, and narrative integrity. Therefore, both sets of results provided a strong basis to formulate an assessment framework based on professional ethics.

Convergence was especially apparent when it came to the focus on ethics, fairness, and narrative integrity. On both sets of data, there was also some support for platform-dependent and rapidly changing technological aspects as part of an assessment rubric, although this was shown to be more desirable than assessing based solely on specific technologies.

Discussion

The results are consistent with current research in media literacy, digital literacy, authentic assessment, and digital ethics, where critical thinking, ethical accountability, and professionalism are all essential elements for evaluation systems in higher education (Wuyckens et al., 2022; Fariás-Gaytán et al., 2023; Händel et al., 2025). In Palestine, media evaluation extends beyond a purely technical exercise and encompasses ethical, narrative, and institutional responsibilities. This finding aligns with media literacy scholarship, which defines competence as “the mixture of critical judgment, social responsibility, and ethical consciousness” (Livingstone, 2004; Potter, 2010). Buckingham (2015) expands this view by arguing that digital literacy should focus on power, representation, and ethics beyond technical skills. These qualitative data support Masterman (2018)’s vision of socially responsible media education, which recognizes that ethical responsibility is embedded in production, supervision, and assessment, rather than an assessment category.

Besides confirming the alignment between theory and practice, these findings reveal that ethical accountability is truly a framework organizing the applied evaluation of media in Palestinian universities. Rather than being an added dimension to the evaluation rubric, ethics is a cross-cutting accountability that governs the crafting of narratives, aesthetics, and even issues in the dissemination of media products. This represents a movement from evaluating competencies to evaluating responsibilities, especially in politically charged contexts of education. These quantitative results point to the preference of accuracy, professional values, objectivity, and coherent narrative above all innovations and fast-changing technical developments within the context of particular platforms. This tendency may be explained by a greater interest in lasting competencies than in tool-based competences. The results provide further support to contemporary assertions that digital ethics should be treated as a fundamental educational skill instead of an ancillary regulatory issue, especially considering the growing role of algorithmic mediation and content generation using artificial intelligence technology (Händel et al., 2025).

The findings concerning narrative integrity and multimodal craftsmanship are consistent with previous research suggesting traditional rubrics can be utilized to describe creativity and multimodality in work (Panadero & Jonsson, 2013; Sparks et al., 2014). In addition to this, the qualitative results show that the

technical aspects were highly valued only when they appeared in an environment of narrative coherence and believability. The increased importance of film, editing, and narrative coherence suggests a greater focus on aesthetics than scoring. This shift to represent technical ability as ethical narrative practice is consistent with film and media evaluation research that situates aesthetic judgment within larger moral and communicative processes rather than subjective idiosyncratic considerations (Schneider, 2017; Schneider et al., 2020). This level of attention to fairness and coherence is consistent with institutional and leadership literature on shared assessment vision as a model for educational change (Leithwood et al., 2008). It is also important to highlight that the qualitative results revealed that the institutional accountability related to students' published work strengthened the teachers' position regarding fairness and logical consistency in grading. The strong support for fairness and logical consistency also aligns with current thinking on authentic assessment, which stresses the need for clear criteria that can assess difficult-to-evaluate performances within an educational setting (Zhan et al., 2025). Though the support level for fairness remained consistent across all project types, the somewhat low scores assigned to certain technological indicators could be attributed to issues relating to the standardization process across varied media types and production contexts. Whereas standardized testing practices promote accountability, limit discretionary grading, and focus on utility and contextual fit (Venkatesh & Davis, 2000), international assessment studies found numerous contextual factors regarding surveillance, clearance processes, and dissemination control, such as political sensitivity, institutional risk, and transparency in Palestinian assessment practices.

Notably, the high level of agreement across demographic variables indicates that the proposed framework describes common professional norms rather than idiosyncratic preferences of particular specializations. Such consensus may facilitate institutional adoption and system-wide implementation. The moderate correlation of the measures used in evaluating platform-specific metrics and trends linked with technologies is indicative of the fact that the instructors have been able to distinguish between sustainable competencies and skills that evolve quickly due to rapid technological changes. Faculty prioritize transferable narrative and ethical skills over temporary software expertise. This is in line with the developing literature highlighting the growing ability of media educators to differentiate between communicative skills and constantly evolving production technologies (Bender, 2023; Pavlik, 2023). The results could also be due to increased recognition of the moral and pedagogical dimensions of new media technologies powered by artificial intelligence that need a framework that takes into account both technology and effective communication and ethics (Matsiola et al., 2024). The conclusion supports the hypothesis that assessment programs should concentrate on sustainable communication and ethics skills.

Practical Implications for Palestinian Media Programs

There are significant implications from the findings for a potential application at the Palestinian universities. First, departments could adopt a unified rubric of ethical assessment that includes the aspects of ethical accountability, narrative integrity, multimodal artistry, fairness, and institutional responsibility. A shared rubric for all the applied courses and graduation projects and student films could increase the uniformity of evaluation and decrease variability of judgment among faculty.

Second, ethical accountability can also take place through supervision controls such as stage reviews, ethical checklists, and departmental approvals for student work that will be publicly displayed. Given the political and social context of media work in Palestine, implementing such measures as additional layers of safeguards at a departmental level would provide a greater degree of protection for the institution as well as encouraging a sense of ethical accountability for students.

Third, the implementation of the framework should be guided by descriptive principles rather than specific tools. These factors of narrative flow, audience credibility, and responsibility for representation and communication will enable universities to continue to be relevant despite rapidly changing media technologies. Periodic curriculum review committees will be able to redefine the technical descriptive points without altering the ethical and communicative core of the framework.

Fourth, faculty calibration processes should be implemented through professional development workshops and peer-review alignment sessions. Professional development workshops and peer-review alignment sessions can help faculty to develop a consistent understanding of the rubric dimensions and so promote fairness across types of outputs and institutions.

Finally, the application of these principles to quality assurance mechanisms, accreditation processes, and curricular design will turn assessment from an educational exercise into a policy tool that enhances transparency, labor market relevance, and accountability.

These findings indicate that ethical reasoning, narrative construction, and integrative assessment constitute essential components of practical media education. The divergence, especially with regard to platform strategy and institutional control, indicates the need for contextualized assessment approaches, which can be based on the global approach but adjusted to local conditions.

Conclusion

This paper explored whether the concept developed by an expert could provide a robust basis for the assessment of applied media work in Palestinian higher education. Qualitative and quantitative outcomes identified an assessment culture based on ethical accountability, narrative honesty, and multimodal craftsmanship as core pillars of professional competence. Ethics emerged as a central component of the production process and was consistently prioritized by faculty members. Technical and aesthetic elements were evaluated in relation to audience trust and narrative coherence, while the cautiousness regarding platform-specific or rapidly evolving tools was a principled difference between pedagogical development and technological adoption.

Nevertheless, there are a few limitations that must be considered. First, while the quantitative sample included faculty members from many different Palestinian universities and was representative of a large portion of the target population, the total number of participants was still relatively small. Therefore, the findings should be interpreted as exploratory in nature; they do not represent a broad or reliable representation of other types of higher educational institutions. The subgroup analyses that compared responses by university, specialization type, and years of experience should also be viewed with caution due to the reduced statistical power inherent in smaller subgroup sizes. Second, data consisted of self-reported perceptions of assessment practices, which may be subject to social desirability bias among participants, especially when addressing ethical accountability in a politically sensitive culture. Third, several restrictions affected access and sampling for this study, such as restrictions of movement and university access. Fourthly, even though there was high intercorrelation between the measures and items along with strong item-total correlations, this particular study failed to use any kind of sophisticated methods related to factor analysis such as Exploratory Factor Analysis (EFA) or Confirmatory Factor Analysis (CFA). The absence of factor-analytic validation should therefore be viewed as a limitation of the current study and an important direction for future instrument refinement. Future research should examine the dimensional structure of the instrument using EFA and CFA with larger samples.

This research contributes to theory in that media literacy, digital literacy, digital ethics, and authentic assessment viewpoints can all be incorporated into a multidimensional framework designed to address emerging issues linked to AI-based media production and assessment in higher education settings (Farias-Gaytán et al., 2023; Pavlik, 2023; Zhan et al., 2025). Practically, these findings highlight the rare instance in higher education where scholars come together to develop a multidimensional, ethics-based assessment rubric. In addition, this report presents the institutions with a roadmap towards achieving standards and professionalism in meeting normative expectations. The use of a mixed methods approach helped ensure that the measures used quantitatively fit into the reasoning behind the assessment process.

This framework is context-driven, and the needs for specific tools can always be re-calibrated. In future studies, the effect of grading rubrics on new medium formats and students' perceptions should be

investigated, especially with regards to how restrictive rules promote creative thinking and ethical decision-making. Longitudinal studies and cross-regional comparisons would further clarify the transferability and sustainability of the proposed evaluation model. Overall, this study suggests that applied media assessment can be considered principled when ethical reasoning, narrative purpose, and technical competence are treated as complementary dimensions of professional practice.

Recommendations

The findings highlight the need for a common ethics-based assessment that puts emphasis on narrative coherence, technical accuracy, and fairness in all institutions. Students should be evaluated through multiple measures across university and media programs, and ethics and participatory storytelling practices must be at the core of production. Improved supervisory structures, with clearer clearance processes, privacy laws, and ethics codes would increase accountability and make applied and graduate school more valuable.

Given the limited confidence in platform-specific and rapidly evolving technologies, curriculum modifications need to be made with a heightened emphasis on instructional goals over short-term tools. Faculty development programs that match criteria can aid in evaluating new media types. Their actual quality of grading is assessed through continuous improvement in assessment models. Future research should examine implementation fidelity, student responses to clearer standards, and the applicability of criteria to new media forms.

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Appendix A. Supplementary Quantitative Results

This appendix presents detailed item-level statistics, enhancement proposals, and inferential analyses that support the results discussed in the main text.

Table A1

Results of the General Evaluation Criteria Axis

No.	Item	Mean	SD	Relative Weight (%)
1	Accuracy of information in journalistic materials	4.28	0.60	85.5
2	Objectivity of content	4.13	0.72	82.5
3	Consideration of legal aspects	3.93	0.86	78.5
4	Adherence to professional ethics	4.23	0.77	84.5
5	Depth of analysis	4.03	0.89	80.5
6	Ability to manage field challenges	4.05	0.68	81.0
Overall Mean		4.10	0.58	82.1

Table A2

Results of the Film Evaluation Axis

No.	Item	Mean	SD	Relative Weight (%)
1	Cinematography quality	4.43	0.68	88.5
2	Visual aesthetics	4.33	0.76	86.5
3	Originality and creativity	4.40	0.59	88.0
4	Narrative pacing	4.10	0.74	82.0
5	Artistic coherence	4.08	0.86	81.5
6	Editing mastery and meaning construction	4.18	0.68	83.5
7	Innovation in editing	4.05	0.85	81.0
8	Temporal synchronization	4.00	0.85	80.0
Overall Mean		4.19	0.55	83.9

Table A3

Results of the Graduation Projects and Applied Outputs Axis

No.	Item	Mean	SD	Relative Weight (%)
1	Artistic–market balance	4.20	0.72	84.0
2	Audience impact	4.05	0.88	81.0
3	Innovation in modern technologies	4.00	0.82	80.0
4	Content–form alignment	4.18	0.78	83.5
5	Fairness across project types	4.03	0.92	80.5
6	Originality and depth	4.10	0.81	82.0
7	Experimentation and innovation	4.25	0.71	85.0
8	Use of modern editing software	4.18	0.75	83.5
Overall Mean		4.12	0.60	82.4

Table A4

Results of the Applied Courses Evaluation Axis

No.	Item	Mean	SD	Relative Weight (%)
1	Journalistic forms and styles	4.10	0.90	82.0
2	Persuasive elements	4.10	0.67	82.0
3	Podcasts and digital radio outputs	3.78	1.07	75.5
4	Professional standards	4.28	0.64	85.5
5	Design and production principles	4.05	0.85	81.0
6	Alignment with course objectives	4.18	0.64	83.5
Overall Mean		4.08	0.66	81.6

Table A5*Results of the Fairness and Logical Consistency Axis*

No.	Item	Mean	SD	Relative Weight (%)
1	Unifying assessment foundations	4.25	0.67	85.0
2	Clarity of standards to students	4.20	0.85	84.0
3	Fairness across output types	4.08	0.80	81.5
4	Adoption considering technological change	4.18	0.84	83.5
Overall Mean		4.18	0.63	83.5

Table A6*Aspects Deemed Necessary for Enhancing Evaluation Criteria*

Aspect	Frequency	Percentage (%)
Innovation and multimedia integration	10	25.0
Strengthening ethical verification	9	22.5
No modification needed	8	20.0
Platform-specific criteria	7	17.5
Simplifying complex information	4	10.0
Audience interaction quality	2	5.0
Total	40	100.0

Table A7*Proposals for Improving Film and Graduation Project Evaluation*

Proposal	Frequency	Percentage (%)
Narrative innovation and audiovisual harmony	11	27.5
No modification needed	11	27.5
Artistic–message integration	9	22.5
Alignment with labor-market needs	9	22.5
Total	40	100.0

Table A8*Group Differences by Demographic Variables*

Variable	Test	Value	p-value
Gender	t-test	0.145	0.887
Teaching experience	ANOVA	1.438	0.248
Specialization	ANOVA	0.428	0.826
University	ANOVA	1.220	0.320

Sociolinguistic Analysis of Lexical Attrition of Pashto in Northwestern Pakistan

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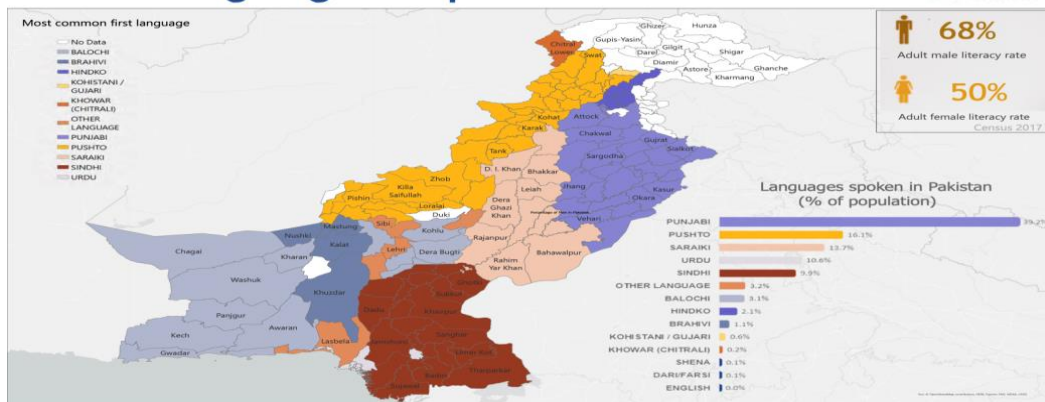
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The surge of globalisation, urbanisation, and state language policies have significantly transformed linguistic hierarchies, elevating the prestige of a few dominant languages while further marginalising many others. The present study explores the sociolinguistics factors driving the lexical attrition of Pashto, a regional language spoken by the Pashtuns in northwestern Pakistan. The data for the study have been collected through questionnaires and wordlist elicitation, with additional insights from informal observations. The findings of the study indicate significant attrition in the Pashto language, with many Pashto speakers reporting reduced proficiency and usage of their native language, specifically among the younger population. The study also identifies several factors that contribute to language attrition, including exposure to the two dominant languages, Urdu (the national language) and English (the official language), the capital associated with these two dominant languages, and migration to urban areas.

Keywords: urbanisation, globalisation, lexical attrition, language loss, pashto language.

Linguistic diversity has been greatly affected by the surge in modernisation and globalisation, which has led to the decline of several regional and minority languages. Another reason of this decline of linguistic diversity is the dominance of the high prestige languages as well. This has a direct impact on an individual's L1 proficiency, which declines due to insufficient linguistic input or exposure to their mother tongue (Moorcraft & Gardener, 1987). Hegemonic languages often eclipse local or regional languages reducing their domains of use and intergenerational transmission as people adopt languages which guarantee social and technological advancement. In order to benefit from better educational and economic prospects, younger generations are increasingly reducing the use of their native tongues in favour of dominant languages. This practice poses an existential threat to many regional languages, leading to their gradual displacement. While some argue that language loss, like species extinction, is an unavoidable outcome of the constantly changing world, others contend that it is a result of social, political, and economic factors that can be challenged. This study hypothesizes that urbanisation and modernisation significantly triggers lexical attrition in Pashto language, which is further intensified due to the continued contact with the dominant languages in the region, i.e., Urdu and English. This also accelerates the phenomenon of language shift amongst the youngsters, which not only contributes to the lexical loss in the Pashto language but also acts as an early indicator of the long-term language decline. This study proposes that a person living in a bilingual environment can experience a significant decline in their L1 competence due to the frequent use and dominance of their second language.

Language map of Pakistan



The 2017-2020 Multiple Indicator Cluster Survey (MICS) records 14 languages spoken in Pakistan. Urdu has the status of official language, but is the fourth most commonly spoken. The survey findings indicate that Punjabi is the most widely spoken as a first language (39% of the population), followed by Pushtu (16%) and Saraiki (14%). Literacy rates were significantly across the different districts of Pakistan and between genders. For men from 80% in Rawalpindi to 26% in Kohlu, and for women from 81% in Central Karachi to 9% in Kotla Palas Kohistan.

The MICS is representative at the district, custom 25 and provincial custom 11 level. As the survey exercise was conducted separately in different provinces, results are not necessarily representative at the national level and should be considered indicative only. Data collection was not conducted for the MICS in the territory of Islamabad or the administrative territories of Kashmir (Azad Jammu and Kashmir) and Gilgit Baltistan.

(Pakistan Map 2023, 2023)

Languages typically disappear due to the extinction of their native speakers, but in Pakistan, the situation is different as the primary threat to local languages stems from the dominance of Urdu and English. The primary objective of attending English-medium schools and pursuing quality education is to secure lucrative employment and sustain a higher standard of living. It has become a widespread fallacy in Pakistan that the use of regional languages might impede community cohesion and, as a result, it might slow down overall progress. Despite being well-educated and knowledgeable, parents generally choose to prevent their children from speaking their native tongue. As a result, children mistakenly believe that English or Urdu is superior to all local languages, including Punjabi, Pashto, Sindhi, Saraiki, and others (Nazir N. , 2019). This study attempts to explore the impact of the dominance of English and Urdu on Pashto.

Pashto is one of the major languages of Khyber Pakhtunkhwa (KPK), a north-western province of Pakistan. Process of modernisation and growing urbanisation have resulted in profound sociocultural transformations within the Pashtun community, driven by improved access to education, enhanced employment opportunities, and greater exposure to other cultural influences. As a result, the Pashto language faces a number of difficulties, as the community struggles with the effects of linguistic interaction, shifting communication patterns, and the expanding influence of capitalism.

According to UNESCO (2016), due to the different sociocultural and sociopolitical factors many of the world languages are either extinct or on the verge of extinction. This alarming linguistic situation demands urgent steps to protect and preserve the endangered languages and to prevent any further linguistic loss. Keeping this in view, the present study focuses on the lexical attrition of the Pashto language in Khyber Pakhtunkhwa, Pakistan. Specifically, it investigates the gradual loss of Pashto lexical items because of the dominance of Urdu and English. This study underscores the significance of documenting and addressing language attrition to safeguard linguistic diversity and cultural heritage by examining the processes and factors contributing to lexical loss in Pashto.

The purpose of this study is to explore how urbanisation, modernisation and the inevitable influence of capitalism and nationalism impact the Pashto language. Furthermore, this study also aims to examine the factors contributing to lexical attrition in Pashto language in Northwestern Pakistan with a focus on the changing linguistic landscape and the nuanced relationship between language and societal change.

Literature Review

Krauss (1992) predicts that at least half of the 6000 languages currently spoken will disappear within the next century. Only 600 languages, or 10%, with at least 100,000 speakers in the "safe" category are protected from extinction. Around 6000 languages are spoken worldwide today, witnessing a reduction from at least 7000 languages spoken around 1500 AD. It only represents the beginning of the 15% decline in linguistic variety, with the rate increasing over the last few decades. Hundreds of languages have vanished, with many on the

verge of extinction, due to mortality of the language speakers, disrupted intergenerational transmission or due to other factors (Bernard, 1996).

Language attrition has always been a matter of significant discussion and value in multiple disciplines like “psycholinguistics, neurolinguistics, and sociolinguistics” (Gurel, 2004). Each of these disciplines approach the issue of language attrition with differing lens and offer distinct insights about the phenomenon. Language attrition arises from various reasons, such as sustained contact with dominant languages, the gradual erosion of a language within communities, and the loss of proficiency at the individual level “in both pathological and non-pathological settings” (Bardori-Harlig & Stringer, 2010). This gradual process occurs over a significant period in which a speaker of L1 loses linguistic competence. The signs of language loss are most significant in the form of lexical attrition. Lexical attrition is the starting point of the whole process, ultimately leading to language loss as a whole. Language loss has always been a major concern for linguists. Language loss does not happen only on the societal level but also on the “personal or familial level” (Haynes, 2010).

Language attrition, may be assumed to be linked with L2 as it is generally believed that the language learned as a second language is more prone to be lost than a native language. According to Cook (2003), language attrition is more common in bilingual speakers who prefer one language to the other. The reasons for such preference vary based on individual choices and societal norms. A lot of research has been done on the topic of lexical attrition and language loss but most of this research has looked into the matter as migration-driven attrition in the migrant communities or individual (Schmid, 2011). Intranational language attrition remains a less researched area where speakers experience lexical or language attrition even though they are still geographically rooted in the same linguistic community. In such cases, the attrition is triggered by other factors like state language policies, globalisation, nationalism, urbanisation or due to socio-economic pressures.

Pakistan is viewed both locally and internationally as a country with rich linguistic diversity. It is also known as the "Land of Many Languages" and a variety of languages, including Punjabi, Saraiki, Pashto, Sindhi, Balochi, Kashmiri, Hindko, Brahhui, Shina, Balti, Khowar, Dhatki, Haryanvi, Marwari, Wakhi, and Burushaski are spoken here (AGENCY, 2018). However, many regional languages are in danger of extinction in Pakistan like many other languages around the world. The issue of language attrition goes beyond the loss of the language itself. Nazir et al., (2013) point out that consistent patterns of language choice have long-term collective effects that include language maintenance and shift. Punjabi, the second most spoken language in Pakistan, is currently experiencing a decline in its number of speakers due to the influence of more dominant languages like Urdu.

Along with globalisation and modernisation, Pakistan’s state-driven nationalism has also contributed significantly to marginalising the regional languages. After independence, Urdu was selected as the national language as a symbol to reinforce national and linguistic unity; however, it was done at the cost of damaging regional languages like Pashto, Sindhi, Punjabi and many others (Rahman, 2002). Sociopolitical and socioeconomic pressures are key factors in causing speakers of different languages to switch or shift their mother tongue. Usually, they prefer adopting Urdu or English because of the utility and prestige linked with these languages (Fishman, 1991). As a result, they forego their mother tongues in this process, a process known as subtractive bilingualism, which means learning a new language at the expense of the first language. (Hornberger, 2008). Social structures, attitudes, and objectives have changed because of the rise of capitalism and the Pashtun community's subsequent integration into international markets.

Many studies have been conducted in Pakistan to observe or identify language attrition but most of these studies remain focused on the macro-level analysis like policy analysis or attitudinal surveys. There has been less focus on the empirical measurement of the language attrition across generations or regions (Rahman, 2002). Moreover, research on Pashto has primarily been centred on language policy and identity, leaving lexical attrition as a measurable linguistic phenomenon underexplored. This study addresses these gaps by comparing rural and urban speakers across generational lines. The study will significantly contribute in understanding how lexical attrition occurs in non-migrant communities due to factors like globalisation or modernisation through empirical evidence.

Research Questions

This study is an attempt to answer the following research questions:

1. What is the level of Pashto language attrition in the younger and older populations of rural and urban areas of KPK, Pakistan?
2. What factors are responsible for the lexical loss in the Pashto language?

Method

Research Design and Procedure

The study employs a mixed-methods approach, qualitative and quantitative analysis, to investigate the underlying causes and contributing factors of language attrition in the Pashto language. Due to the exploratory nature and feasibility consideration of the research, two primary tools were employed: a vocabulary elicitation task and a structured survey. These instruments were helpful in diagnosing the patterns of lexical attrition and language use among the native Pashto speakers.

The respondents' vocabulary loss, loss of semantic distinction and reduced native linguistic performance, which are key linguistic features of language attrition, was assessed through word elicitation tasks. They were invited to complete the task either in written form or orally, depending on their preference and literacy level and they could register their response in any major Pashto dialect. Picture prompts were used to support comprehension, where it was required. The final judgments were made through consensus among three native-speaking researchers representing different dialects.

In addition to the vocabulary test, a survey was conducted using a structured questionnaire to gather insights into speakers' language choices and perceptions of language decline. The questionnaire comprised three sections: general information (demographics), language practices and choices of native Pashto speakers with 10 closed-ended items, and factors of language attrition, including two open-ended items inviting participants to reflect on perceived causes of decline in Pashto proficiency and changing attitudes toward the language. Responses to the open-ended questions were analysed qualitatively to uncover deeper sociolinguistic insights into language shift and attrition dynamics within the Pashto-speaking community.

Sampling

Six regions of KPK i.e., Bannu, Lakki Marwat, Buner (rural areas) and Peshawar, Mardan, and Newshehra (urban areas) were selected as the sample for the study. The rationale behind choosing this sample was that these areas are Pashto dominated, thereby facilitating the collection of more authentic data. Non-probability sampling techniques was employed in selecting the sample with a combination of purposive and snow-ball sampling. Personal and professional networks were used to approach the participants through direct contact on online platforms like WhatsApp. In some cases, these participants also referred others within their communities who met the study criteria. The study uses anonymized participant data. Anonymization procedures were implemented without any distortion of meaning or analytic claims.

Vocabulary Test

The vocabulary test comprised both basic and advanced vocabulary items to capture varying degrees of lexical vulnerability. Basic vocabulary (e.g., hot, throw, beautiful) consisted of high-frequency, concrete words typically acquired during early childhood and reinforced through everyday use, making them more resistant to attrition. In contrast, advanced vocabulary (e.g., aeroplane, appreciate, vision) included low-frequency and more abstract terms that are often learned through formal education or encountered in specialised discourse domains, and are therefore more susceptible to forgetting (Kopke & Schmid, 2004; Schmid, 2011). The selected vocabulary was further categorised by grammatical class, which includes nouns, verbs, and adjectives, since research suggests that verbs, in particular, tend to be more prone to attrition due to their syntactic complexity and lower activation in casual speech (De Bot & Weltens, 1991).

To reflect the sociolinguistic realities of Pakistan, each item in the test was presented in English along with its Urdu translation, as these are the dominant languages in the country. It may be noted that natives in

rural areas are more familiar with Urdu as compared to English due to less exposure while individuals in urban areas have significant exposure to both English and Urdu. That is why inclusion of Urdu provided an accessible reference point for respondents, facilitating lexical retrieval and minimising comprehension barriers. This trilingual format enabled participants to translate or recall Pashto equivalents from dominant-language cues, revealing patterns of lexical replacement, interference, or retrieval difficulty. The vocabulary test is provided in Appendix A.

The vocabulary test was taken by 60 native Pashto speakers. Out of these 60 participants, 30 were selected from the rural areas (Bannu, Lakki Marwat and Buner) and 30 were from urban areas (Peshawar, Mardan, Newshehra). Each group of 30 was further divided into two groups on the basis of age i.e., the younger group (15–40 years) and the older group (41 years and above). This stratified sampling approach allowed for providing insights into the potential effects of age and environment on lexical attrition in Pashto through comparisons across both geographical (rural vs. urban) and generational (younger vs. older) lines.

Survey

Although the sampling method was non-random, survey participants were stratified during analysis into four groups based on the demographic information provided in the questionnaire: urban younger, urban older, rural younger, and rural older. The purpose behind this was to enable meaningful comparisons across age and regional backgrounds. The survey questionnaire was distributed to a total of 200 native Pashto speakers from selected rural and urban areas of Khyber Pakhtunkhwa. 118 respondents completed the survey out of the 200 and only these were included in the final analysis. Table 1 presents the distribution of the sample population used in the study.

Table 1
Sample of the Study

	Age Group	Demographics	No of Participants	
			Each Group	Total
Vocabulary Test	15 above and 40 below	Rural	15	60
		Urban	20	
	41 and above	Rural	10	
		Urban	15	
Survey	15 above and 40 below	Rural	40	118
		Urban	42	
	41 and above	Rural	21	
		Urban	15	

Justification of Research Procedure

Since lexical attrition is a difficult process to identify that is why mixed method research design was utilised. The quantitative tools helped in the examining the patterns and the extent of the lexical loss. Meanwhile, qualitative analysis was helpful in digging deeper in to the phenomenon to analyse the factors which contribute to the lexical loss in Pashto. According to many research scholars, lexical attrition is the first step towards language loss (De Bot & Weltens, 1999). Keeping that in mind, vocabulary elicitation task was utilised as core instrument as it allows to measure the lexical differences across speaker groups in a controlled manner and reduces subjective self-assessment that may act as a hurdle in measuring linguistic competence. The vocabulary task was further complemented by conducting a structured survey which was helpful in examining linguistic practices across different social domains. This combination of vocabulary task and survey also helped in the validation of the findings by identifying differences between linguistic practices of the different age groups with respect to their language attitudes and language performance.

Results

Vocabulary test

Lexicon and grammar are closely interconnected, as many grammatical rules are encoded within lexical items. Consequently, lexical loss can impair the application of combinatorial rules, leading to disruptions in grammatical accuracy and overall language structure (Paradis, 2004). Moreover, limited lexical access may contribute to a decline in the mental lexicon, affecting word retrieval, fluency, and grammatical processing (Köpke & Schmid, 2004).

The vocabulary test required participants to produce the correct Pashto equivalent for each vocabulary item. Their responses were considered regardless of dialectal variation, provided they reflected authentic usage. The accuracy of responses was determined through consensus among the three native Pashto speaker researchers representing different Pashto dialects. This collaborative evaluation ensured linguistic inclusivity and dialectal sensitivity in assessing lexical retention, for example, for the noun ‘garlic’, the Pashto translations ‘ooga’ and ‘ozha’ or ‘weezha’, variants from different Pashto dialects, were considered correct. The test score was calculated by taking the average percentage for each group. Table 2 presents the score of each group, and Figure 1 displays the results in a stacked bar graph.

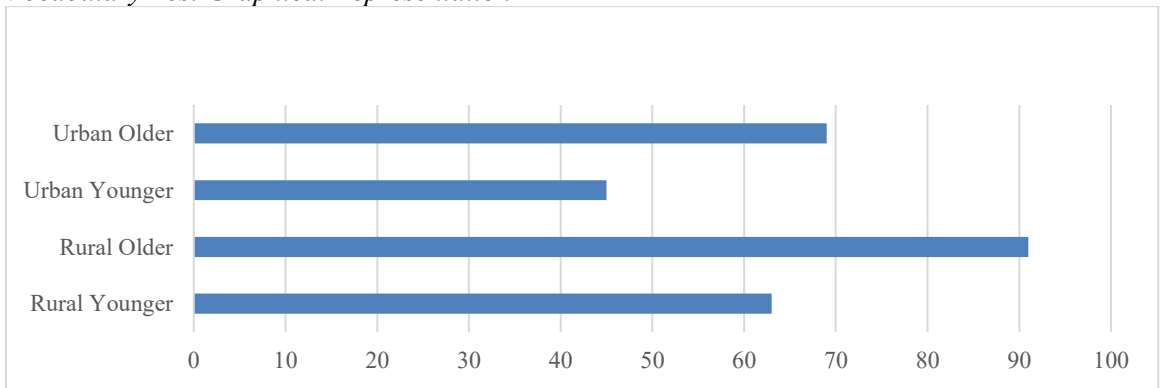
Table 2

Vocabulary Test Score

Pashto Speaker Group		Vocabulary Test Score
Rural	Younger	63%
	Older	91%
Urban	Younger	45%
	Older	69%

Figure 1

Vocabulary Test Graphical Representation



The highest score on the graph is the older rural population which demonstrates that lexical loss is lowest in this group as they are less exposed to other languages due to their location, and their major social circle is largely restricted to Pashto speakers only. The lowest performance in the vocabulary test was recorded among the urban younger population, which appear the most vulnerable group and exhibit the greatest lexical loss. There may be different reasons but apparently, this group would be soon at the helm of affairs. Interestingly, the urban older participants performed better than the rural younger participants, demonstrating the impact of other languages on the language attrition of the younger generation of the rural population probably through social and main media. The results support the argument that lexical loss arises from language shift, leading to progressive language change which, if left unaddressed, may ultimately culminate in language death.

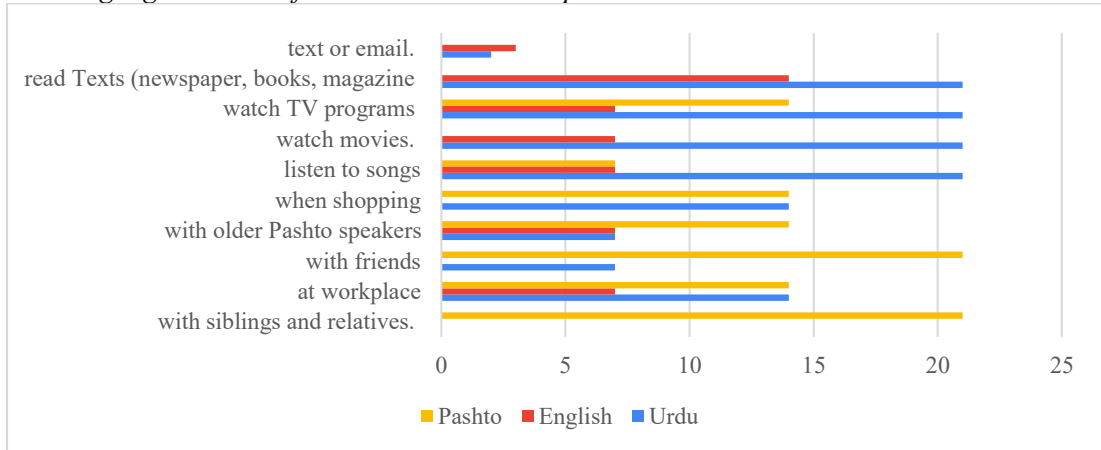
Survey

To quantify the responses obtained through the questionnaire, they are illustrated in the stacked bar graph under a separate heading for each group. In all the given four graphical charts the horizontal axis shows the number of speakers and the vertical axis shows the choice of language for different communicative purposes.

The Language Choices of the Older Rural Pashto Speakers

The quantification of the responses from the respondents of this age group is presented graphically in Figure 2. The linguistic system of these speakers was shown to be dominated mainly by English and Urdu. A general picture of the linguistic choices of these speakers can be observed in Figure 2.

Figure 2
The Language Choices of Older Rural Pashto Speakers



The graphical representation of the responses in Figure 2 clearly illustrates that Urdu and English along with Pashto are the most significant languages in the lives of the older rural generation of Pashto speakers. This group seems to prefer Pashto in most contexts due to their older age and rural living conditions both of which provide greater exposure to the Pashto language. In this group of Pashto speakers, the Pashto language is more prominent in communication with siblings, relatives, and friends. 100% of the respondents have confirmed using Pashto with siblings, relatives, and friends. Additionally, 66.6 % of the respondents primarily speak Pashto with older Pashto natives. The same percentage of the respondents use Pashto for communication while shopping in the marketplace, and prefer watching Pashto TV programs. This percentage plunges to 0% in case of reading Pashto texts or watching Pashto movies. All of the respondents also confirmed that if involved in communicative events that include communication technologies like texting or emails they preferred English or Urdu.

The Language Choices of the Younger Rural Pashto Speakers

The responses of this group were significantly different from the rural older generation, confirming the influence of age on language preferences. The graphical representation of the responses of this group is given in Figure 3.

Figure 3
The Language Choices of Younger Rural Pashto Population

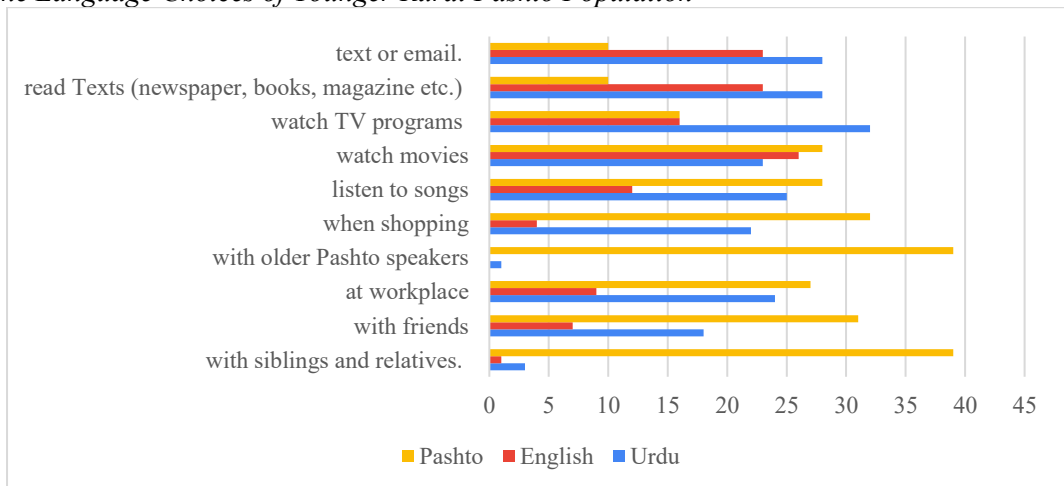


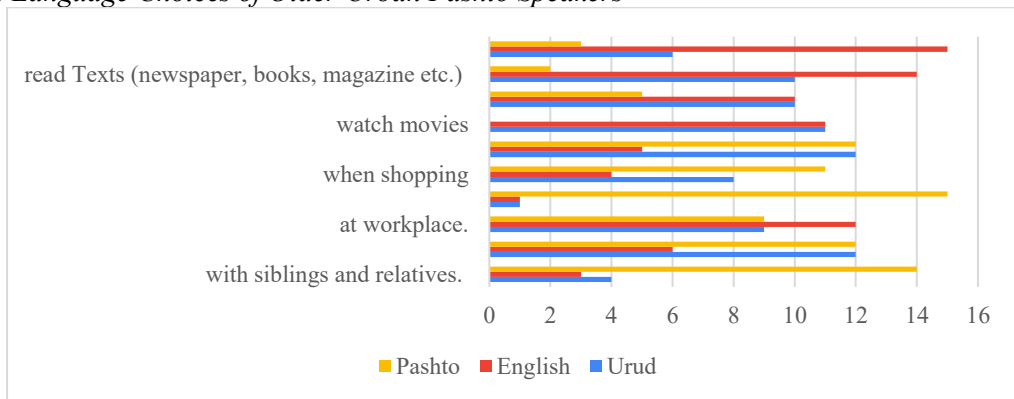
Figure 3 demonstrates that the rural younger generation of Pashto prefers to opt for Pashto in most settings. A significant number (95%) of the participants prefer using Pashto when interacting with older Pashto speakers, siblings, and relatives. Further, 82% use Pashto for shopping, and 80% choose it for communicating with friends. 67% listen to Pashto songs and watch Pashto movies and 65% use Pashto in the workplace. This

group of Pashto speakers preferred English and Urdu while watching TV programs, reading newspapers, books, and magazines, or texting and email. This group’s linguistics choices indicate their preference for Pashto whenever possible, however, when other languages are chosen it is often due to the carcicy of resources in the Pashto language in TV programs, newspapers, books, and the dominance of English in communication technology.

The Language Choices of the Older Urban Pashto Speakers

This group’s responses were significant for the study as these speakers live in language communities where multiple languages are commonly spoken. Despite this exposure, their responses depict their clear preference for the Pashto language. English is the second preferred language based on the overall data. The responses of the older urban population are presented in Figure 4.

Figure 4
The Language Choices of Older Urban Pashto Speakers



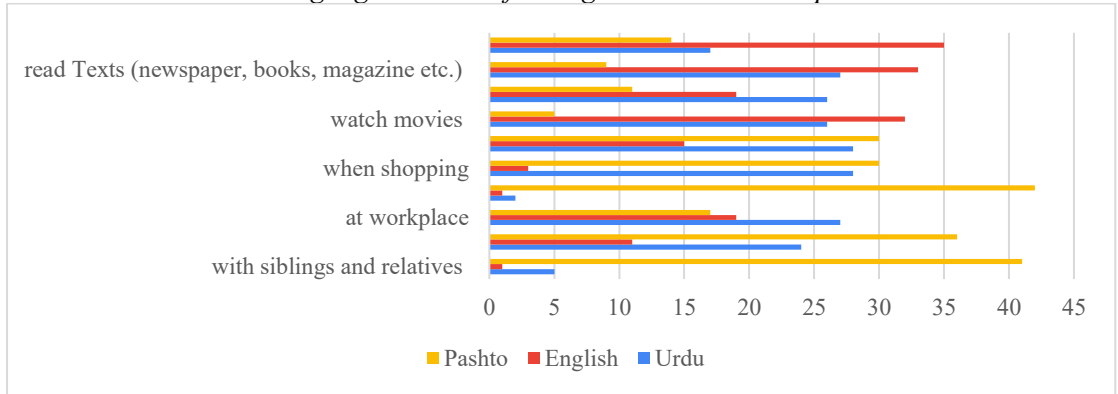
All the respondents (100%) of older urban Pashto speaker community choose Pashto to speak with older Pashto speakers and 93% prefer using it with siblings and relatives. 80% opt for Pashto to communicate with friends and listen to Pashto songs. 73% use Pashto in the market place and 60% communicate in Pashto in the workplace. From top to bottom the first three bars (watching TV programs, reading newspapers, books, magazines, or text and email) show that Pashto is not the dominant language of choice for this group. Their first preference is English followed by Urdu in such communicative events.

The Language Choices of the Younger Urban Pashto Speakers

The data obtained from this group is particularly noteworthy because younger speakers are often assumed to be more vulnerable to language attrition in Pashto. Contrary to this assumption, the survey responses did not reflect the expected level of attrition. However, the vocabulary test results challenge this pattern, as this group performed the poorest compared to all other groups. This discrepancy between self-reported responses and actual vocabulary performance highlights the need for further validation to generalize the findings. The responses of younger urban Pashto speakers are illustrated in the bar graph (Figure 5).

Figure 5

The Language Choices of Younger Pashto Urban Speakers



Like the other three groups, 100% of the respondents confirmed using the Pashto language with older Pashto speakers. 97% speak Pashto with siblings and relatives and 86% with friends. 79% listen to Pashto songs and choose to speak in Pashto when shopping. However, in the rest of the five contexts, including speaking in Pashto at the workplace, watching Pashto movies and Pashto programs, reading Pashto texts (newspaper, books, and magazines), and texting or email, English and Urdu languages dominated Pashto, with English even dominating Urdu in four of the five contexts. This shows the frequency with which the Pashto language, as a communication tool among speakers, is shrinking across the generations.

Factors Identified for Language Attrition by the Respondents

In the survey, Pashto speakers were asked to identify the factors they think contribute to the attrition of the Pashto language. The responses highlighted several factors contributing to the lexical attrition in Pashto. 55% of the participants claimed high proficiency in their native tongue, 32% categorised their proficiency level as good and 12% considered their proficiency level only sufficient enough to communicate. This shows that half of the selected native speakers lacked the confidence to rate their proficiency as very good.

The speakers cited several major reasons for the decline in their proficiency. Of the participants, 41% identified relocation as major reason for L1 decline. While 39% blamed media for using a different language other than Pashto, 33% of the respondents attributed the decline in their L1 proficiency to the absence of Pashto in the school curriculum. Additionally, they noted that their preference for speaking their peers’ language (15%), changes in household language (15%), and family changes (11%) also impacted their proficiency in Pashto. More than half (60%) of the participants mentioned that English has become a major lingua franca in the workplace communication, and Pashto is no longer taught in educational institutions as there are no job prospects associated with the Pashto language. Further, the native speakers identified that their peers avoid speaking in Pashto on public forums, as most of the people in the surroundings do not understand this language. Besides, they also feel that Pashto and its speakers are undervalued in society. In other words, it is not the preferred language for those who are status-conscious and associate prestige with the English Language. The provincial government has also not taken significant measures, particularly in the educational institutions to promote the Pashto language. Further, it does not promote the Pashto language through cultural events, broadcasting TV shows, dramas, or movies to protect it. Parents also often overlook that to use a language other than Pashto at home can lead to the language attrition over time.

The participants also mentioned that erosion of literacy skills (reading and writing) is the biggest threat to Pashto. Moreover, attrition is also caused by commercialization as people are less likely to study Pashto if it does not offer them a secure career path. The mainstream media as well as the private schools have played a pivotal role in disturbing the social fabric of the Pashto medium. The decline in hujra (social gathering forum) and the lack of a joint family system is another cause of language attrition in Pashto. People cannot understand Pashto maxims (*matalis*) because the younger generation avoids sitting with the elders. Urbanization, modernization, and materialism are also the reasons for the attrition of the Pashto language, as they keep people constantly occupied and make them unable to spend time with their families. Furthermore, the participants also

stated that the native speakers have stopped taking pride in their native language and do not associate covert prestige to it.

Discussion

The performance of the older urban Pashtun was much better as compared to both urban and rural younger Pashtuns. This indicates that younger generation is more tending towards language decay because of the major inspirations from modernization. These findings align with the existing literature as the same trends were noted by Rahman (2002) by studying how Punjabi speakers were leaving their language and internalising Urdu. According to Mansoor (2004), plurilingual societies often observe language shift because of better social and economic aspects offered by the high esteemed languages. There is a strong opposition to linguistic shift in more culturally embedded societies as social identity play important role in language perseverance (Fishman, 1991).

Language attrition in Pashto, however, must also be observed through interrelated viewpoints of nationalism and global integration. Although modernization and the impact of global languages like English substantially contribute to language shift, the institutional approval of Urdu as a manifestation of national unity has further marginalised regional languages such as Pashto. In urban environments, where Urdu and English dominate in education, media and professional interactions, younger Pashtuns feel increased pressure to comply to language standards considered more revered or financially beneficial. This explains for their relatively greater level of vocabulary loss. The lack of official endorsement for Pashto, proved by its negligible occurrence in educational courses, official setups, or media representations, deteriorate the issue further. Accordingly, the drifting away from Pashto in cities signifies not just global economic influences but also national language strategies that have prioritised Urdu over other languages.

When enquired about the language they would prioritise in different social contexts, majority of the participants (95% to 100%) leaned towards Pashto with family, relatives, friends and elders. Although, this inclination substantially dropped to 60%-82% in workplace communications. Merely the older rural population prioritised Pashto TV media, while the other Pashtun fractions liked Urdu or English TV media. The prevailing ruling existence of Urdu as national and English as international language in media industry is sidelining regional languages like Pashto. The Pashto entertainment industry lacks development because of meagre sponsorship, which eventually leads to poor production quality and lose appeal to urban and modernised Pashtun population. As a result, they prefer Urdu and English entertainment TV programmes and films. These observations resonate with research by Fishman (1991), who endorsed that the influence of dominant languages on regional language usage in media industry affects linguistic decline of the regional languages. Also, the limited use of regional languages in few avenues and its insignificance in social, economic and political requirements of routine endeavours has also caused language decay. Moreover, Hornberger (2002) emphasised that how prioritising dominant languages in formal and official settings resulted language drift and degeneration of regional languages. Spolsky (2002) also endorses this by arguing the influence of language policies on the degeneration and sidelining of regional languages.

Due to a lack of comprehension in Pashto script, all groups overwhelmingly preferred English and Urdu for emails and texts when communicating electronically. Although Pashto is quite an important component of their ethnic identity, especially when it comes to oral communication, it was not preferred in formal schooling settings and was not useful in terms of employability (Ullah, 2020). This change was exacerbated by English-focused policies in Pakistani schools, which reduced Pashto's literacy value and relegated it to oral usage (Ullah, 2020). The results of Tollefson and Tsui (2004), who address how language regulations can deprive linguistic groups of their socioeconomic rights, are in line with these observations. Urbanization (41%), underrepresentation in the media (39%), and a lack of academic activities in schools (33%) were the most common issues cited by respondents as having an impact on their Pashto proficiency. Significant reasons were also identified as the preference for speaking Pashto with peers (15%), the transition from joint to nuclear family structure (11%), and the change in family language habits from Pashto to Urdu and English (15%). The findings of Pauwels (2016), which showed that languages with little media presence are more vulnerable to attrition, are in line with Pashto's underrepresentation in the media.

According to De Houwer (2019) and Guardado (2020) peer pressure and social networks are crucial for language maintenance. Although the desire to speak Pashto with peers suggests that language use has a social component, this preference is inadequate to offset larger socioeconomic pressures. According to King et al., (2008), language transmission is greatly influenced by family language practices. Language shift is more likely when nuclear family structures replace joint family structures because there are fewer options for language transmission across generations.

According to Sardaraz (2021), lexical expressions in Pashto have their foundations in deep cultural behaviors. For instance, in Pashto language, 'the past' can be talked about as 'at the front' and the future as 'behind'. This is clearly in stark contrast to how English language would represent the concept of time. Vocabulary from more dominant languages like Urdu/English translated into Pashto would not necessarily replace the lexical expressions in Pashto but also their culturally ingrained meanings or structure. Hence, the rising incidence of lexical attrition observed in Pashto speaking regions underpins a fundamental restructuring. Once the culturally embedded indigenous lexical terms or phrases fade away because of their lack of use, the cultural background behind those terms would also cease. This would suggest a complete cultural shift or transformation. Lexical attrition can, therefore, signal a restructuring of social and cultural foundations.

Due to the nature of the current study, which examined the causes and contributing variables of language attrition in the Pashto language, the qualitative portion was quite brief, even though the survey fully addressed the research questions. This conciseness can be viewed as a limitation of the study. Nevertheless, it offers a chance for future research to conduct in-person, semi-structured interviews or focus groups to thoroughly examine the relevant field. Additionally, future research in the field may need to carefully examine additional socioeconomic characteristics, such as respondents' academic and professional backgrounds and gender.

Conclusion

Pashto language attrition and language shift are determined by urbanization, modernization, and dominant languages, indicating global patterns of language endangerment. However, language disintegration is more than just a linguistic problem; it is the loss of worldview, identity, memory, and culture. Therefore, this study has both practical and theoretical value. On an operational scale, this study emphasizes the urgent need to shift from preservation as a sentimental act to framing Pashto as a social, cultural, and economic resource for future generations. A comprehensive plan needs to be devised to save Pashto from any threat of extinction in future, for instance, providing early education to Pashtuns in Pashto, providing job opportunities for those having Pashto skills, investing resources to educate Pashtuns to take pride in their heritage language through workshops and seminars, and by offering them financial incentives such as scholarships for Pashto studies. Language in education policies promoting additive bilingualism may also allow Pashto speakers to thrive in global contexts while sustaining their heritage.

Theoretically speaking, this study expands the field of language attrition by widening its focus beyond migration contexts, which have historically been the focus of the majority of research, to intranational settings influenced by modernization, urbanization, and the predominance of national and international languages. The results reinforce the bigger debate on language shift by highlighting the intricacies of several social factors, such as acculturation, assimilation, and feelings of alienation, which accelerate attrition. Fundamentally, preserving Pashto is about rethinking cultural sustainability in a globalized world, not just about preserving a language.

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APPENDIX A
VOCABULARY TEST

Respondent Name _____ (Optional)
Age: 16-40 41 & Above
Residing Area: Rural Urban

	Basic Vocabulary			Advanced Vocabulary		
	English	Urdu	Pashto	English	Urdu	Pashto
Noun	Corner	گوشه		threat	دھمکی	
	Smoke	دھواں		Nomads	بدوش خانہ	
	thorn	کانٹا		riddle	پہیلی	
	arrival	آمد		vision	بینائی	
	garlic	لہسن		aeroplane	ہوائی جہاز	
Verbs	Throw	پھینکنا		appreciate	کرنا تعریف	
	steal	کرنا چوری		germinate	اگانا	
	insult	کرنا توہین		Dig	کھودنا	
	escape	ھونا فرار		plough	چلنا ھل ہ	
	shout	چیخنا		hope	کرنا امید	
Adjectives	Beautiful	خوبصورت		Direct	براہ راست	
	Hot	گرم		Brave	بہادر	
	Ugly	بدصورت		Twenty-Three	تئیس	
	long	طویل		Host	میزبان	
	under	نیچے		Talkative	باتونی	

The Growth of Renewable Energy Sector in Central Asia: Business Potential and Policy Support

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Central Asian states historically have been reliant on fossil fuels for energy production however the growing energy needs and climate mitigation commitments have pushed the region to reconsider their energy sector trajectories. Central Asia is endowed with huge natural resources and the renewable energy industry seems highly promising provided that the governments incentivize with good regulations and cooperate within the region. In fact the transition to renewable energy is not without hurdles. Various challenges i.e. limited access to long-term financing, lack of transparent, inadequate grid infrastructure and consistent regulations and institutional bottlenecks pose significant hurdles. This paper aims to investigate the investment landscape for renewable energy in three Central Asian countries i.e. Kazakhstan, Uzbekistan, and Kyrgyzstan, exploring the intersection of policy frameworks, foreign direct investment (FDI), and business environment factors. The research attempts to identify key enablers and barriers in the growth of renewable energy, to analyze policies and regulatory frameworks that incentivize investment in renewable energy, to assess the role of foreign direct investment (FDI) and international cooperation in shaping the renewable energy sector thus offering policy recommendations for accelerating a just and sustainable energy transition across the region. The trajectory of renewable energy investment in Kazakhstan, Uzbekistan, and Kyrgyzstan is shaped not by mere resource abundance, but also by the intricate interplay of institutional capacity, regulatory clarity, and the implementation of targeted policy frameworks. The research methodology is primarily qualitative in nature, employing explanatory and exploratory approaches to understand and explore the understudied aspects of the subject matter that is renewable energy sector, its potential, investments and policy .

Keywords: Renewable Energy, Kazakhstan, Kyrgyzstan, Uzbekistan, Regulatory Framework, Foreign Investment

Renewable energy comes from natural sources that are renewed within a human timescale, for example solar, wind, hydro and geothermal power. While the world dealing with bigger environmental and energy issues, renewable energy is now a main part of sustainable development and climate action (Huaping et al., 2019). There is tremendous business opportunities in renewable energy sector, since it provides a way to invest in technology, infrastructure and related services to boost the economy, generate employment and encourage new ideas (Chen, 2014). Central Asia has considerable growth potential in the renewable energy sector for example, Kazakhstan and Uzbekistan benefit from vast steppes and arid zones with high solar irradiance while mountainous Kyrgyzstan and Tajikistan have ample potential for expanding small hydropower projects. Technical assessments from IRENA (2020) and the World Bank (2022) estimate that Kazakhstan and Uzbekistan possess over 3,000 GW of solar potential and 300 GW of wind potential, while Kyrgyzstan is endowed with over 140 TWh/year of economically viable hydropower capacity (UNDP, 2022). However it is government incentives,

good regulations and the cooperation of nations that help make the renewable energy market safe, attract investment and encourage companies to be actively involved.

The research work aims to investigate the investment landscape for renewable energy in Central Asian countries i.e. Kazakhstan, Uzbekistan and Kyrgyzstan, exploring the intersection of policy frameworks, foreign direct investment (FDI), and business environment factors. By analyzing and comparing these three countries, the research seeks to identify key enablers and barriers in the growth of renewable energy, offering policy recommendations for accelerating a just and sustainable energy transition across the region. The study also aims to bridge existing knowledge gaps by systematically applying institutional theory to compare how institutional capacity, regulatory clarity, and policy implementation directly shape the renewable energy investment landscape by providing a comparative, multi-dimensional analysis of renewable energy investment dynamics in Central Asia particularly in Kazakhstan, Kyrgyz Republic and Uzbekistan. The research work also attempts to achieve key objectives such as to evaluate the current state of renewable energy infrastructure in Kazakhstan, Uzbekistan and Kyrgyzstan, to analyze policies and regulatory frameworks that incentivize investment in renewable energy, to assess the role of foreign direct investment (FDI) and international cooperation in shaping the renewable energy sector and to examine the broader business environment in the three Central Asian Republics that affects investor confidence and project implementation.

Research objectives are achieved by answering the following research questions: What is the current state of renewable energy infrastructure in Kazakhstan, Uzbekistan and Kyrgyzstan? What policies are in place to support or incentivize investment in renewables? What is the role of foreign direct investment (FDI) and international cooperation (e.g. World Bank, ADB)?, and how does the business environment in the three Central Asian Republics impact investor confidence in the renewable energy sector? The research methodology is primarily qualitative in nature, employing explanatory and exploratory approaches to understand and explore the understudied aspects of the subject matter that is renewable energy sector, its potential, investments and policy frameworks through logical thinking, scientific abstraction, analysis, re-interpretations, synthesis, induction and deduction. Secondary sources have been used to interpret, reinterpret and evaluate the subject matter using the content analysis method to draw appropriate conclusions.

The transition to renewable energy in Central Asia has become a growing area of scholarly and policy interest, reflecting a broader regional shift toward sustainable energy systems. The literature on this subject encompasses studies on technical potential, policy frameworks, investment climate, and institutional capacity, offering valuable insights into the region's renewable energy trajectory. Literature review reveals several recurring themes: the need for consistent and transparent policy frameworks, the importance of international partnerships and the challenge of integrating variable renewables into existing grids. However, there are gaps in comparative studies across Central Asian states especially regarding private sector participation and sub-national implementation. Furthermore, few studies provide a comprehensive analysis that combine policy review, investment trends, and investor perceptions in a single framework. Literature on the subject matter suggests that while Kazakhstan and Uzbekistan have made considerable progress in attracting renewable energy investment, Kyrgyzstan remains constrained by institutional and infrastructural challenges. The transition to renewable energy is not without hurdles. Various challenges i.e. limited access to long-term financing, lack of transparent, inadequate grid infrastructure, inconsistent regulations and institutional bottlenecks pose significant hurdles. Nevertheless diversifications of energy sources in the face of growing domestic energy needs accompanied by global momentum toward sustainable energy, climate change and its mitigation have pushed Central Asian states to reconsider their energy sector trajectories.

Current State of the Energy Infrastructure in Central Asia

Contemporary Central Asia's energy landscape has been shaped by its Soviet legacy marked by centralized planning, outdated infrastructure, and limited market incentives. Overland (2011) outlines how post-Soviet institutional inertia has complicated reform processes, though recent policy shifts signal a departure from fossil-fuel dependency. The decades' old obsolete and outdated energy infrastructure in Central Asia including relatively developed Kazakhstan where 44% energy infrastructure is more than 30 years old poses challenges in transition to renewable energy. Due to the rich resource endowment, the region has been heavily reliant on fossil

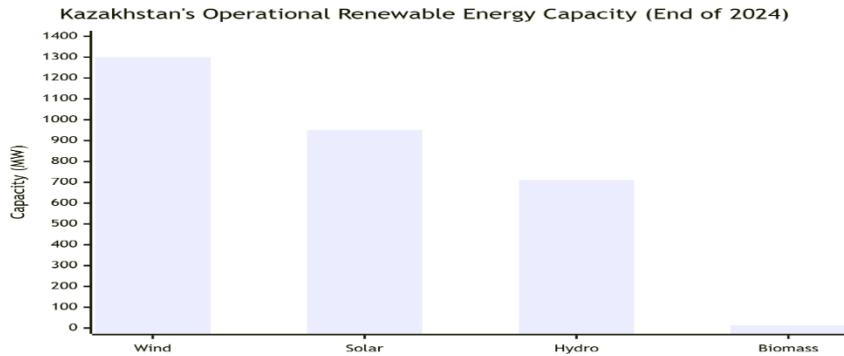
fuels, particularly oil and natural gas in Kazakhstan, Turkmenistan, Uzbekistan and hydropower in Kyrgyzstan and Tajikistan. This fossil-fuel dependence has shaped not only the energy infrastructure but also the economic structures and geopolitical alignments of these countries. According to International Energy Agency, coal contributes 51% and crude oil contributes 54% to Kazakhstan's energy mix (IEA, 2022). According to the Energy Resource Guide, coal has the major share 64.7% in the energy mix of Kazakhstan while hydropower contributes around 12.3% to the total power generation (Energy Resource Guide, 2021). The current state of renewable energy infrastructure in Kazakhstan seems promising though with a small share in total energy mix. By the end of 2024, there were total 148 renewable energy plants operational in Kazakhstan with a total capacity of 2903.7 MW making 6.67% share in total energy generation (Astana Times, 13 December, 2024). These included 59 wind farms, 46 solar power plants, 40 hydroelectric plants, and 3 biomass plants. It is evident that Kazakhstan needs to move from coal and other fossil fuel energy sources to renewable energy sources in order to reduce carbon emissions in a cost-effective way.

Uzbekistan has rapidly enhance its share of renewable in energy mix during the last year or so though still heavily dependent on fossil fuel where gas generated energy makes roughly 75% of the energy mix, oil and oil products makes around 14% while renewable energymakes 11% by 2026 (World Bank Group, n.d.). By the end of 2024, solar and wind power plants produced 4.5 billion kWh electricity in the Republic and attracted nearly \$3 billion foreign investment. According to the Uzbekistan's Ministry of Energy, 2331 solar power plants were installed during the first half of 2025 with a total capacity of 191.6 MW. Karakalpakstan, Navoi region and Bukhara with steady wind currents have been identified as ideal for wind power plants. Unlike its neighbors, Kyrgyzstan derives over 90% of its electricity from hydropower (IEA, 2021). Hydropower generation remains the most exploitable renewable energy source for Kyrgyz Republic having the highest hydro power potential as both the main rivers of Central Asia i.e. Amu Darya and Syr Darya originate in the mountains bordering Kyrgyzstan. However the lower riparian countries Uzbekistan, Turkmenistan and Kazakhstan are heavily dependent on these two rivers for irrigation purposes. Therefore development of small scale and micro hydro power plants may properly address the cross border water security issues and energy balance for Kyrgyzstan and Tajikistan as suggested by Azimov, Ulugbek and Nilufar Avezova (2022). Central Asian Republics through developed renewable energy sources aim to avoid depleting valuable sources, to limit greenhouse emissions and global salt migration and to avoid wastages in energy production (Tursunaliyevna et al., 2025). The renewable energy sources hold immense potential in Central Asia due to the region's favorable geographical and climatic conditions. Recognizing this potential, governments in the region have initiated policy frameworks, introduced investment incentives and partnered with international financial institutions and private investors to support the growth of renewable energy.

Kazakhstan: Policy Leadership and Market Innovation

Renewable energy policy and market progress in Kazakhstan are being led by the country's focus on eco-friendly growth and a wide-ranging economy (UNDP, 2022). Kazakhstan-2050 sets a long-term goal for renewable sources to provide half of the nation's electricity by 2050 and it hopes to get to 15% by 2030 (Shustov, 2019). One of the ways Kazakhstan has met its goals is by moving from feed-in tariffs to holding auctions which has also attracted plenty of investment by foreign countries in wind and solar projects. Steps like constructing green hydrogen facilities reveal how committed the country is to clean energy. Because of the Astana International Financial Centre (AIFC) which is now open, Kazakhstan is becoming the leading country in green finance and attracting investments for green projects. These efforts demonstrate how Kazakhstan is working actively towards greener energy sources and a growing economy. According to a Kazakh national source, 98% of Kazakhstan's energy mix is made of fossil fuels i.e. 38% of coal, 36% of oil and 24% of natural gas (Sembayeva, 2024).

The geographic and climatic conditions of Kazakhstan make it suitable for sustainable wind power and solar energy generation in addition to rich uranium deposits for civil nuclear energy production in future. Kazakhstan plans to develop three civil nuclear power plants in collaboration with Russia's Rosatom and China's National Nuclear Corporation (Sukhankin, 27 June, 2025). As per the Asian Development Bank Institute working paper, Kazakhstan has been the most capable to develop renewable energy resources (Shadrina, 2019).



The Concept for the Transition to a Green Economy' of the Republic of Kazakhstan provides the policy framework for the development of renewable energy sector which envisions and aims to enhance the share of renewable energy comprising solar, wind, hydro and nuclear in the total energy mix up to 15% by 2030 and 50% by the year 2050 (Chikanayev, 2022). Kazakhstan needs to invest at least 1% of its GDP or 3 to 4 billion US dollars every year to enhance the share of renewable energy to 50% by 2050 with enhanced share of wind and solar energy to 39%, nuclear and hydroelectricity to 14% while reducing coal powered generation to 31% (Aminjonov, 2020).

The Law No. 165-IV of July 04, 2009 of the Republic of Kazakhstan defines the goal, forms, direction and mechanisms for supporting renewable energy sources and their utilization while the Law No. 588-II dated July 09, 2004 is the key regulatory framework governing electricity supply in Kazakhstan. (Chikanayev, 2022).

Kazakhstan has the most liberalized national electricity market in Central Asia. Kazakhstan, having one of the world largest uranium deposits, plans to move forward with nuclear energy plant consortium during 2025. The Republic has emerged as a regional leader in renewable energy due to its proactive policy stance and relatively stable investment climate. To attract foreign investment for the development of renewable sources, Kazakhstan has established an electronic auction system ensuring open and transparent implementation process. The "Green Economy Concept" (2013) sets a target of 50% of electricity from renewable sources by 2050. Studies by Gordeeva et al., (2022) and Boute (2019) highlight Kazakhstan's implementation of feed-in tariffs (2013–2017), transition to reverse auctions (2018 onward), and green certificates as key innovations in market design. The State-Owned Development Bank of Kazakhstan and the Asian Development Bank, the European Bank for Reconstruction and Development (EBRD), the Asian Infrastructure Investment Bank, the Eurasian Development, the Industrial and Commercial Bank of China and the Chinese Development Bank have been the major financiers in the large-scale renewable projects of Kazakhstan.

The EBRD (2021) has supported several projects under public-private partnerships, while German, Chinese, and UAE investors have participated in tenders. By 2026, China has invested \$2 billion in Kazakhstan's solar and wind projects including Aktobe, Karaganda, and Almaty regions. China is dominating Central Asian renewables market with high-tech components and expertise to overcome production overcapacity at home while developing infrastructure in the region. In cooperation with the EBRD, Kazakhstan commissioned the largest solar energy plant in Central Asian during 2019 ((Shadrina, 2019). The green energy sector has been prioritized by the Republic having huge potential for attracting foreign direct investment. Foreign investment in large-scale renewable energy projects is governed by the Inter-governmental Agreement (IGA) between the government of Kazakhstan and the investor's home government. The agreement stipulates and administers the entire life cycle of renewable energy projects covering key issues such as land use rights, tariffs, grid exclusivity, minimum purchase, payment conditions and financing guaranties in power purchasing agreements (Jun, 2025). However, challenges remain in grid integration and the slow development of energy storage. Limited connectivity to

regional and extra-regional markets is a common regional challenge to ensure a secure and sustainable supply (Alparslan, November, 2024).

Uzbekistan: Rapid Reforms and International Cooperation

Uzbekistan is undergoing a significant transformation in its energy sector, marked by rapid reforms and robust international cooperation. The government has set ambitious targets to increase renewable energy capacity to 27 GW and achieve a 40% share of renewables in electricity generation by 2030 (Boute, 2019). Main legislative measures includes the 2019 Law on Renewable Energy Sources and the Law on Public-Private Partnership, have been enacted to foster private sector participation and attract foreign investment. Uzbekistan has also engaged in numerous international partnerships, signing agreements with global entities to develop solar and wind power projects. These concerted efforts underscore Uzbekistan's commitment to a sustainable energy future through policy innovation and global collaboration. The growing population and economy are causing substantial increase in energy demand for Uzbekistan. Growing energy demand and energy intensity force Uzbekistan to unlock the huge potential of renewable energy and thus mitigate environmental impacts by reducing natural gas consumption in energy production. The energy intensity of Uzbekistan's GDP though declining in recent years, remains much higher than that of European countries (four times higher) and twice the world average. (IEA, n.d.).

Uzbekistan has the most prospective potential in wind and solar energy in the region. The technical potential of solar energy is 593000 MW and wind is 1600 MW (Aminjonov, 2020). Uzbekistan's renewable energy reforms accelerated following President Mirziyoyev's economic liberalization agenda. The Energy Strategy 2030 envisions 25% of electricity from renewables by 2030 with 6% share of solar energy in the total energy mix. The Republic also envisages renewable energy export to EU via Kazakhstan and Azerbaijan by 2030 as the Presidents of Uzbekistan, Azerbaijan and Kazakhstan signed a strategic agreement on production and transmission of green energy in November 2024 (Sergey, 2025).

The country has successfully attracted international investors through transparent auctions, competitive procurement, and public-private partnerships (ADB, 2021; World Bank, 2022). Uzbekistan has significantly improved the investment climate and noticeably improved indicators for ease of doing business i.e. 74th out of 190 countries in 2028 and 69th in 2019, taxation, and receiving credit (from 154th in 2013 to 55th in 2018) (IEA, n.d.). This in turn indicates improved regulatory environment conducive for business and high trust of investors. The investors from China, European countries and Gulf nations have expressed readiness to finance renewable energy projects in Uzbekistan (Sergey, 2025). China has invested in projects like the 400 MW photoelectric plant in Uzbekistan's Andijan region and the Zarafshan wind farm. Saudi Arabia's ACWA Power and Emirates' Masdar have emerged as key players in the in Uzbekistan's renewable energy development as both planning 3.1 GW and 3.2 GW prospective wind and solar power plants respectively (Kozybay, 2023). The landmark 100 MW Nur Navoi Solar Project, awarded to Masdar, exemplifies the success of reforms in renewable energy sector. The World Bank Group is also helping Uzbekistan in developing 1000 MW solar and 500 MW wind energy plants. The World Bank Group also approved \$100 million concessional credit for Uzbekistan for enhancing renewable energy integration into its electricity distribution network (World Bank Group, May, 2025). Uzbekistan in collaboration with Germany has also initiated a \$350 million worth solar power plant. The construction and maintenance of solar and other renewable energy plants also increase employment opportunities and stimulate economic growth in addition to clean energy, import of skill and technology and positive impact on environment. Omonov and Suyunov (2020) emphasize the role of multilateral finance, especially sovereign guarantees and viability gap funding, in mitigating investment risk. However corruption, deficiencies in innovative technologies, infrastructure gaps such as grid up-gradation, high production cost, lack of technically skilled labor force, distribution and technical losses and arid climate such as sandstorms may impede the growth of renewable energy in the country.

Table 1
Planned Renewable Energy Projects in Uzbekistan

Company	Project/Timeline	Outlook/Investments
MASDAR MUBADALA (UAE)	100 MW Solar power plant/2021	900 MY capacity / 800 million USD
TOTAL EREN (UAE)	100 MW Solar power plant/2021	150 million Euro
ASIAN DEVELOPMENT BANK	100 MW Solar power plant/2021	1000 MW capacity/800 million USD
MASDAR MUBADALA (UAE)	Wind park 500 MW	500 million USD
ACWAPOWER (SAUDI ARABIA)	Wind park 1500 MW	-
LIAONING LEADER POWER ELECTRONIC (CHINA)	Wind park 2000 MW	-
SIEMENS GAMESA (GERMANY)	Wind park 100 MW	-
ETKA CO ENERJI (TURKEY)	Wind Park 600 MW	-
ASIAN DEVELOPMENT BANK	24 MW Small hydropower facility/2023	60 million USD
EUROPEAN BANK	Refurbishing 4 small hydropower plants	100 million USD

Source: Europe-Uzbekistan Council on Economic Cooperation, “Uzbekistan Energy Overview,” *Uzbek Review Market Insight Report*, October 7, 2019

Kyrgyzstan: Hydropower Dominance and Diversification Challenges

Kyrgyz Republic provides a number of incentives through the Law on Renewable Energy adopted in 2008 including tax and custom duty exemptions on import and export of relevant technology/equipments, relief from licensing on generation and guaranteed purchase of energy (IEA, n.d.). In March 2013, the Law on Energy Saving was adopted to address the issues related to efficiency. The task of developing energy efficiency and energy saving has been assigned to the State Committee on Industry, Energy and Subsoil Use. The Committee also supervises the Department of Renewable Energy Development. National Strategy for Sustainable Development 2018-2040 prioritizes energy efficient technologies for the sector (IEA, n.d.). Asian Development Bank report based on World Bank indicators has given 100 score regarding legal framework for renewables developed by Kyrgyz Republic, however only 5 score for planning the expansion of the sector (Shadrina 2019).

Small hydropower and distributed solar PV have been identified as priority areas in national energy planning (UNDP, 2022). World Bank has been undertaking and financing Renewable Energy Development Project worth \$125.7 million in the Kyrgyz Republic (World Bank Group, June, 2023). First phase of the Project worth \$80.2 million approved and started in 2023 and will be completed by 2028 which aims to construct new HPPs (hydro-power plants) as well as rehabilitate the existing ones for increased electricity generation and strengthen the transmission system, technical, operational, and management functions of the Ministry of Energy in the Republic (World Bank Group, n.d.). The Asian Development Bank is rehabilitating the Toktogul Dam in two phases with \$305 million financial assistance. The Eurasian Development Bank has been financing (\$138 million) installation of Kambarata-2 hpp having a capacity of 360 MW while the Swiss government provided \$22.2 million for At-Bashy hydro-power plant (IEA).

However, the lack of diversification poses risks related to seasonal variability and climate change. Yet, the literature—such as studies by Abdullaev and Rakhmatullaeva (2019) indicates persistent institutional weaknesses, including policy fragmentation, weak regulatory enforcement, and an underdeveloped private

sector. Additionally, the limited capacity of the national grid to accommodate variable renewable energy further complicates large-scale integration. Energy related infrastructure is aged, worn and therefore inefficient resulting in more than 20% losses. However energy saving potential in Kyrgyzstan is much higher. It is estimated that the Republic can save up to 25% electricity and 15% heat (IEA, n.d.). Limited access to affordable bank loans also impedes renewable energy development as the lending rate is around 20% in Kyrgyz Republic (Shadrina 2019).

Institutional Capacity and Regulatory Landscape

Across all three countries, institutional capacity and regulatory clarity are major determinants of investment outcomes. Overland and Vakulchuk (2018) argue that the investment climate in Central Asia is shaped more by governance quality than resource availability. Inconsistent application of rules, limited transparency, and political risk has hindered investor confidence, particularly in Kyrgyzstan. Nevertheless, reforms such as one-stop investment portals in Uzbekistan and streamlined permitting in Kazakhstan have improved perceptions among international investors (World Bank, 2020). The intricate tapestry of investment outcomes across Kyrgyzstan, Uzbekistan, and Kazakhstan is woven primarily from the threads of institutional capacity and regulatory clarity. While endowed with significant natural resources, the fundamental truth, as compellingly argued by Overland and Vakulchuk (2018), is that the investment climate in Central Asia is shaped far more decisively by the quality of governance – encompassing the strength, predictability, and fairness of institutions and regulations – than by the mere presence of oil, gas, or minerals. This governance gap manifests with stark consequences, particularly in Kyrgyzstan. Here, the inconsistent application of rules creates a landscape of profound uncertainty for businesses. A foreign mining company might secure permits after arduous negotiations, only to find local authorities arbitrarily reinterpret regulations or demand new, unforeseen fees months later. Coupled with limited transparency – where critical regulatory decisions or tender awards often occur behind closed doors without clear justification – and a persistent backdrop of political risk, exemplified by the volatile power shifts following the 2020 and 2022 upheavals, investor confidence has been severely hindered. This toxic combination deters long-term capital commitments, stifles job creation, and relegates the country to attracting primarily smaller, speculative ventures or resource extraction projects willing to navigate high-risk environments, leaving its broader economic potential unrealized. The tangible result is a persistent shortfall in sustainable Foreign Direct Investment (FDI), a direct casualty of institutional weakness.

Yet, the narrative across Central Asia isn't uniformly bleak. Recognizing the crippling cost of poor governance, neighboring states have embarked on ambitious reform journeys. Uzbekistan, emerging from decades of isolation, launched a sweeping transformation post-2017, explicitly targeting the bureaucratic quagmire that once defined its investment landscape. A cornerstone of this effort was the introduction of one-stop investment portals, such as the "Invest Uzbekistan" platform. Imagine a European textile manufacturer exploring expansion: previously, navigating registration, tax codes, customs procedures, and sector-specific licenses required weeks of trudging between disparate, often opaque ministries. Now, the portal offers a centralized digital interface, standardizing requirements, enabling online submissions, and providing real-time tracking. As documented by the World Bank (2020), these reforms demonstrably slashed processing times, reduced opportunities for graft by minimizing direct official contact, and introduced unprecedented levels of procedure transparency. This systemic overhaul sent a powerful signal to the international business community that Uzbekistan was serious about change, gradually rebuilding trust and positioning Tashkent as a more credible destination for diverse investments beyond its traditional resource base.

Similarly, Kazakhstan, long the region's economic leader yet burdened by its own cumbersome bureaucracy, focused its reform energy on streamlining permitting. The notorious complexity and duration of obtaining construction permits or environmental approvals were significant pain points, often cited in investor surveys as major deterrents. Initiatives like the "Business Roadmap" program targeted these specific bottlenecks, standardizing requirements, digitizing application processes, and imposing strict deadlines on regulatory bodies. A logistics company seeking to build a warehouse near Almaty, for instance, might now encounter a more predictable, albeit not perfect, pathway. The World Bank (2020) acknowledges that these efforts have tangibly improved perceptions among international investors, contributing to a more positive assessment of Kazakhstan's business environment in global indices. However, the journey is far from complete. The spectre

of corruption, particularly in procurement and inspections, and the lingering challenge of inconsistent enforcement – where well-connected entities might still circumvent rules – continue to cast a shadow. These persistent issues underscore the difficulty of embedding reform deep within institutional cultures and highlight the ongoing need for vigilance and further modernization to lock in gains and ensure a truly level playing field.

Therefore, the contrasting experiences of Bishkek, Tashkent, and Astana vividly illustrate the paramount importance of robust institutions and clear regulations. Kyrgyzstan's struggles underscore the high price of institutional fragility, while the reform trajectories of Uzbekistan and Kazakhstan, as validated by World Bank (2020) observations, demonstrate that targeted, credible actions to enhance governance capacity and regulatory predictability can yield significant dividends in improved investor sentiment and, ultimately, greater economic dynamism. The lesson for Central Asia is unequivocal: sustainable investment flows are built not just on resource wealth, but on the bedrock of effective governance.

Role of International Financial Institutions and Donor Support

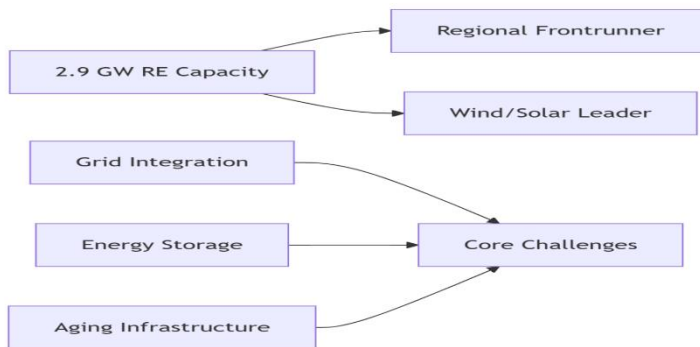
Multilateral institutions have played a pivotal role in supporting renewable energy deployment in the region. The ADB (2022) and IRENA (2020) document how blended finance, technical assistance, and project preparation facilities have enabled the design and financing of bankable renewable energy projects. The EBRD's Kazakhstan Renewables Framework and the World Bank's Scaling Solar Program in Uzbekistan are key examples. These programs not only provide financial support but also help address regulatory bottlenecks and build local capacity. The stark steppes and sun-scorched valleys of Central Asia hold immense renewable potential, yet unlocking this green energy revolution has hinged critically on the scaffolding provided by international financial institutions and donor support. For countries like Kazakhstan and Uzbekistan, transitioning from fossil-fuel dependence to wind and solar dominance presented not just technical challenges, but profound financial and regulatory chasms. Early projects often languished in a "valley of death"—too risky for commercial banks yet too complex for state budgets alone. This is where multilateral institutions stepped in as essential architects of change.

As meticulously documented by the ADB (2022) and IRENA (2020), their intervention went far beyond mere funding. Through blended finance structures—mixing concessional loans, guarantees, and private capital—they transformed speculative ventures into bankable projects. A Kazakh wind farm developer, for instance, might secure 70% commercial debt only because an ADB partial credit guarantee absorbed the risk local banks refused to shoulder. Simultaneously, technical assistance programs demystified complex grid integration studies and environmental impact assessments, while project preparation facilities covered critical pre-feasibility costs—like detailed solar irradiance mapping in Uzbekistan's desert regions—that stalled countless initiatives. Two flagship endeavors epitomize this multifaceted approach: The EBRD's Kazakhstan Renewables Framework didn't just finance 2 GW of wind and solar installations; it established standardized power purchase agreements (PPAs), trained regulators on tariff-setting methodologies, and funded retrofits for grid substations—simultaneously dismantling technical, financial, and policy barriers. Similarly, the World Bank's Scaling Solar Program in Uzbekistan functioned as a full-cycle solution. When Tashkent aimed to auction its first major solar plant, the World Bank didn't merely offer loans. It provided a ready-made competitive bidding template, handled site selection via satellite analysis, pre-negotiated grid connection terms with Uzbekenergo, and even drafted anti-corruption protocols for bid evaluation. This turnkey model slashed project development time from years to months, culminating in the successful 100 MW Nur Navoi Solar Plant—a template replicated nationwide. Critically, these programs recognized that money alone couldn't sustain progress. Embedded within each initiative were deliberate capacity-building components: EBRD engineers trained Kazakh technicians in turbine maintenance, while World Bank consultants coached Uzbek ministries on contract enforcement best practices. This knowledge transfer ensured that once foreign experts departed, local institutions could manage subsequent projects independently. The legacy of this institutional engagement is profound. By 2023, Kazakhstan's renewable capacity surged past 2.5 GW—a feat unimaginable a decade prior—while Uzbekistan's solar auctions became regional models of transparency. As the ADB (2022) underscores, multilateral support didn't just fund megawatts; it built the regulatory DNA and human capital necessary for a self-sustaining energy transition, proving that strategic donor alignment can catalyze entire green economies.

Conclusion

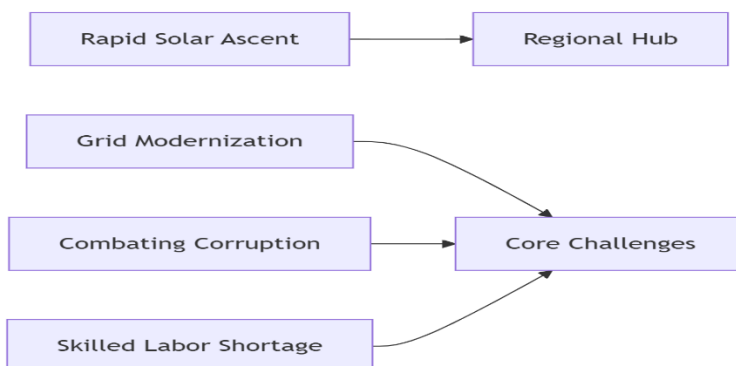
In summation, the trajectory of renewable energy investment in Kazakhstan, Uzbekistan, and Kyrgyzstan is shaped not by mere resource abundance, but by the intricate interplay of institutional capacity, regulatory clarity, and the implementation of targeted policy frameworks. Overland and Vakulchuk (2018) cogently argue that it is the quality of governance—manifested through robust institutions, consistent policy application, and heightened transparency—that serves as the true lodestar for attracting and sustaining investment, far surpassing the influence of natural resource endowments.

Kazakhstan’s Energy Outlook



Kazakhstan has distinguished itself as a regional frontrunner by advancing its “Green Economy Concept” and pioneering innovative market mechanisms such as reverse auctions. These efforts have yielded substantial growth in wind and solar capacity, though the country continues to grapple with persistent challenges in grid integration and energy storage, which are critical for the next phase of its renewable transition. The catalytic role of international financial institutions cannot be overstated. Programs such as the EBRD’s Kazakhstan Renewables Framework, alongside blended finance instruments championed by the ADB (2022) and IRENA (2020), have been pivotal in de-risking projects, addressing regulatory bottlenecks, and cultivating essential local capacity. Yet, the sustainability of these gains is contingent upon deeper and more enduring domestic reforms. For Kazakhstan, the imperative lies in accelerating grid modernization and developing advanced storage solutions.

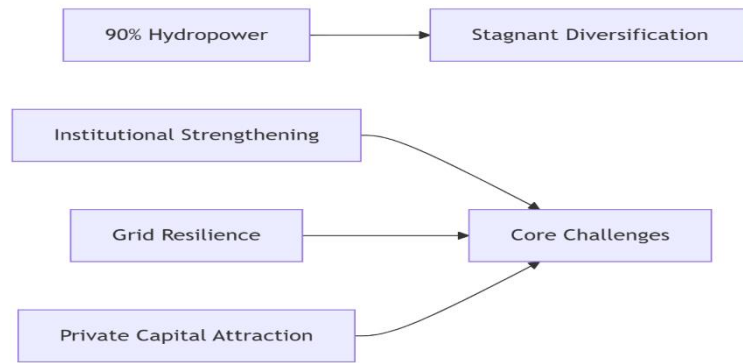
Uzbekistan’s Energy Outlook



Uzbekistan’s rapid ascent in the renewable energy sector further illustrates the transformative power of decisive regulatory reform. Initiatives such as the World Bank’s Scaling Solar Program and strategic partnerships with global investors like Masdar and ACWA Power have been underpinned by transparent auction processes

and the establishment of one-stop investment portals (World Bank, 2020). These reforms have markedly improved the investment climate, even as infrastructural limitations and legacy inefficiencies remain. Uzbekistan needs to intensify its efforts to combat corruption and further upgrade its energy infrastructure.

Kyrgyzstan's Energy Outlook



Kyrgyzstan, meanwhile, faces an urgent need for regulatory stabilization and enhanced grid resilience to unlock its full renewable potential beyond hydropower. In contrast to Uzbekistan, Kyrgyzstan, despite its significant hydropower potential (UNDP, 2022), remains hampered by institutional fragmentation, elevated political risk, and an overdependence on a single renewable source. This has stymied diversification efforts and deterred foreign direct investment, underscoring the critical need for comprehensive institutional strengthening.

Ultimately, the prospects for a successful energy transition in Central Asia rest on the fortification of governance frameworks that guarantee predictability, equitable contract enforcement, and sustained investor confidence. Future policy agendas should prioritize regional cooperation to facilitate grid interconnectivity, bolster sub-national implementation capacity, and design context-specific risk mitigation strategies to attract a broader spectrum of private capital. Only through the consolidation of robust institutions and the articulation of coherent, forward-looking policies Central Asia can fully realize its vast renewable energy promise and secure a sustainable, resilient energy future for the region.

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CPEC Sustainable Development Project: Prospects and Challenges for Gilgit-Baltistan's Tourism Industry

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The research makes an attempt to analyze China-Pakistan Economic Corridor (CPEC) Sustainable Development Project which offers both opportunities and challenges for the tourism industry in Gilgit-Baltistan. The study used H. R. Sontag's Dependence theory, which allows to examine how Chinese investment and economic dependence affect the resilience and sustainable development of the country's tourism sector. The research makes a conclusion that the implementation of a sustainable development project within the framework of the CPEC for the Gilgit-Baltistan region and its tourism sector potentially will have the following consequences. In a positive format: economic growth, improved interaction between the population, development of infrastructure and logistics routes and regional development in general, creation of new jobs, promotion and marketing. The challenges in this case are security, cultural, religious issues and threats to the ecology and environment. The methodological basis of the study is using systematic and statistical methods (sampling method). The comparative analysis of tourist flows based on open data from Pakistani government agencies were made. Secondly, sociological polls were conducted at the Karakoram International University and the stakeholder on the public perception of the impact of the CPEC on the development of the region's tourism industry .

Keywords: China-Pakistan economic corridor, China, Gilgit-Baltistan, sustainable development, tourism.

The tourist industry is considered to be the largest in the world and is vital to the progress of any state's economy. In numerous countries, tourism serves as the principal means of stimulating economic expansion and launching novel economic ventures. Economic gains for host cities are the consequence of increased demand for goods and services, jobs created within the economy, and infrastructure development facilitated by tourism. By promoting tourism, the less developed countries increase income and revenue, which lowers poverty and increases the number of employment chances. The China-Pakistan Economic Corridor (CPEC), a massive infrastructure and development project, aims to build a network of pipelines, railroads, and roads to connect Xinjiang, a region in northwest China, with the Gwadar Port in southwest Pakistan. CPEC has the potential to provide Pakistan's tourism industry both large benefits and obstacles, despite its primary focus on energy and transportation infrastructure (Menhas, et al., 2019).

Currently in a crucial element that influences the host community's behavior in terms of tourist development is the local community's level of satisfaction with beneficial tourism. A straightforward route to tourist attractions is made possible by improved transportation and road infrastructure, which also strengthens economic activities that have a big impact on the level of living in the surrounding areas. It is anticipated that the development of this global initiative will transform Pakistan's northern areas, particularly Khyber Pakhtunkhwa and Gilgit-Baltistan, into the nation's tourism hub. Beautiful resorts, lakes, and glaciers can be found in these regions. According to a number of studies, improving local roads and transportation systems is crucial for boosting tourism in the region and developing new tourist attractions (Ismail, 2021).

Firstly, boost to economic of country. Creation jobs for whole region. Secondly, enhancing the living stander of peoples. Built Road and Railway system to easy transportation system. Exports and imports are increased. Overcome energy crises. Security of life and property.

However, CPEC presents difficulties that must be carefully handled due to comprehensive strategy that takes into account economic, social, and environmental concerns is necessary for sustainable development must involve stakeholders at all levels of decision-making (Alam et al., 2025).

Objectives of study: 1) to assess the impact of the China-Pakistan Economic Corridor on the long-term sustainability of the tourism sector in Gilgit-Baltistan; 2) to identify and analyze the challenges faced by the tourism industry in the context of CPEC, examining potential obstacles and risks; 3) to explore opportunities that arise from the CPEC project for the development and growth of the tourism sector in Pakistan, considering economic, social, and environmental dimensions.

Sustainable Development via CPEC: Gilgit-Baltistan's example

The CPEC is the greatest investment Pakistan has received since independence, and China's largest investment in any country. The project is seen as critical to Pakistan's economic, social and strategic development. The Pakistani media and government have referred to the CPEC investments as a game and fate changer for the region, and both China and Pakistan hope that the enormous investment plan would convert Pakistan into a regional economic powerhouse and strengthen the two nations' already strong ties. The corridor is significant for Pakistan's trade and industry, social development, overcoming the energy crisis, and as a benefit project for the people of Pakistan and China, as well as the advancement of both countries' futures (Hussain et al., 2021).

It should be stressed on the port city of Gwadar in Pakistan which is connected to the Chinese province of Xinjiang through this project. China is funding several infrastructure initiatives in Pakistan, including building roads, ports, trains, industrial zones, telecommunications, health care facilities, and educational institutions. Pakistan's social and economic circumstances would be greatly enhanced by the successful completion of these projects. After thorough investigation, both countries will see changes in geography and economy. This project will be beneficial in many ways, such as increasing investment and creating jobs in the local community. Additionally, it enhances the system of integration and transportation (Awais et al., 2019).

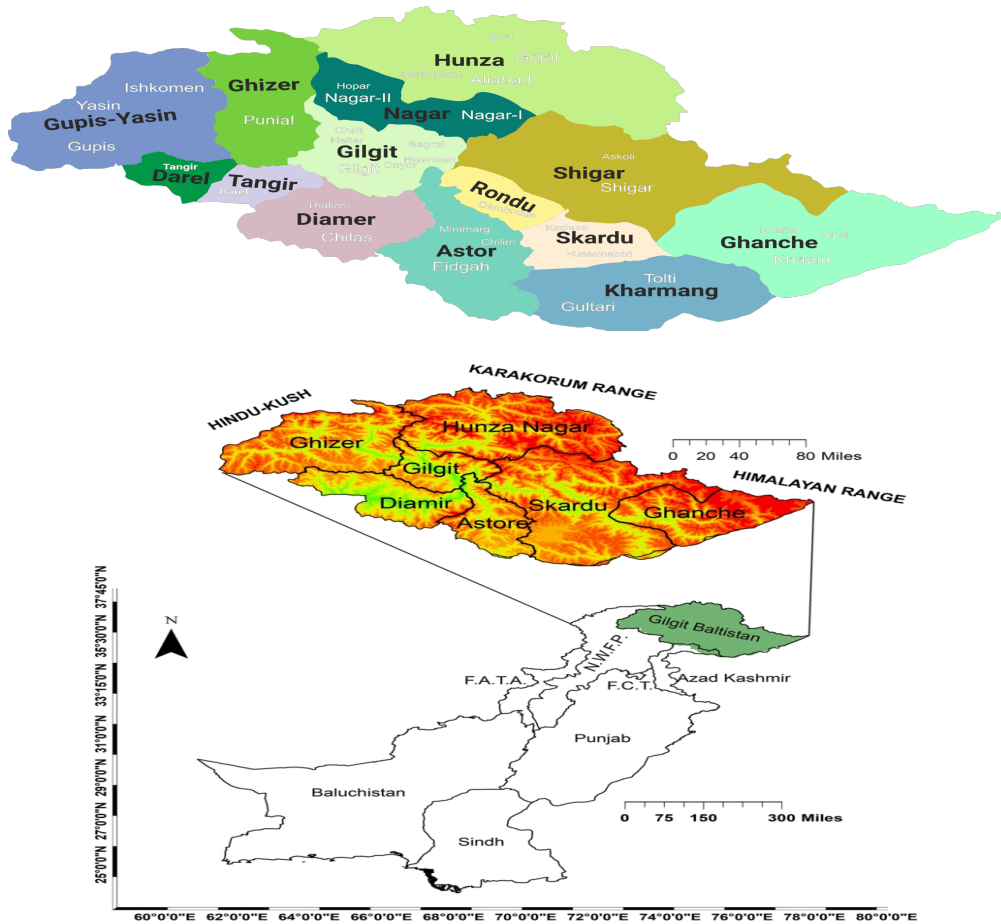
Pakistan's location between the Middle East, South Asia, Central Asia, and China makes it excellent. Pakistan is regarded as the middle place for any commercial activity or business trade due to its ideal location. Without a doubt, it is anticipated that the CPEC will provide many benefits, including potential for economic development in both nations, particularly in Pakistan because to its wealth of natural and people resources. Here in some examples which are include energy projects, the building of the Gwadar port, road infrastructure, special economic zones, Lahore Mass Transit, fiber optics, etc. The project has completely changed Pakistan's economy. It will stimulate business development, increase employment opportunities, and manage the electricity shortage. Additionally, it will result in a greater connection between urban and rural areas. Thousands of new job opportunities are created by this flagship project for local communities,

rural areas are connected to major cities, new educational facilities should open, healthcare facilities should also improve, new technologies are adopted, and Pakistan’s social situation is improved (Mahmood et al., 2020).

These innovative projects are anticipated to have positive effects on society by raising people’s standards of living and altering their perspectives, in addition to bringing economic and social wellbeing. In turn, Gilgit-Baltistan (G-B) is part of a project that updates research on the impact of the CPEC on the tourism sector of this region of Pakistan.

Figure 1-2.

Geographical location of Gilgit-Baltistan



Source: Ali, Wang, Hussain, Lu & Nurunnabi, 2021.

Geography of Gilgit-Baltistan

Pakistan’s administrative territory in the north of the nation is called Gilgit-Baltistan. August 29, 2009, saw the awards of self-governing status to it. There are 12 districts in three divisions of Gilgit-Baltistan. The Baltistan Division includes the four districts of Skardu, Kharmang Shigar, and Ghanche; the Gilgit Division includes the four districts of Gilgit Ghizer, Hunza, and Nagar, which were separated from the Gilgit District; and the third division, Diamer, includes the districts of Chilas and Astore (which was separated from the Diamer District in 2004). Gilgit and Skardu are the principal political hubs. Gilgit-Baltistan is home to some of the world’s highest mountain ranges. The main ranges are the Karakoram and the western Himalayas. The Pamir mountains are to the north and the Hindu Kush lies to the west. Amongst the highest mountains are K2 (Mount Godwin-Austen) and Nanga Parbat, one of the most feared mountains in the world (Figure 1-2).

Theoretical framework and methodology of the study

According to the H.R. Sonntag, the Dependency Theory can provide important insights into the dynamics of economic development and dependency in a case study on the difficulties and prospects facing Pakistan's tourism industry within the context of the CPEC. Dependency theory is a school of thought in modern social science that aims to comprehend underdevelopment, analyze its origins, and to some extent, provide ways to overcome it. It emerged in Latin America in the 1960s, gained traction in academic settings, and gained regional traction (Sonntag, 2001).

The main aspects and tasks of the theory:

- analyzing Economic Dependency and examine how Pakistan's tourism sector is dependent on external factors, such as China for investment on infrastructure development, and tourism-related projects under CPEC;
- Assessing Power Imbalances of power dynamics between Pakistan and China in the context of CPEC. China's economic influence affect Pakistan's decision-making and policy choices related to tourism development;
- Sustainability through that's examined whether the dependency on external investments, including those from CPEC, has implications for the sustainability of Pakistan's tourism sector (Sonntag, 2001).

In this research paper, applying the Dependency Theory in a case study can help to comprehend the effects of economic ties and external dependencies, notably those with China via CPEC, on Pakistan's tourism industry. Within the broader framework of economic reliance, this theory can assist in identifying potential challenges and opportunities for sustainable development particularly in tourism sector.

The area of study: to make a research on the challenges and opportunities for the tourism sector in G-B within the context of the China-Pakistan Economic Corridor; to assess of the impact of CPEC on the Sustainability and Development of the Tourism Sector in Gilgit-Baltistan.

In research mixed-methods approach, combining stakeholder interviews, tourist surveys, and on-site observations, to analyze the impact of CPEC on Pakistan's tourism sector and derive data-driven recommendations for sustainable development. To identify the position of the population of G-B regarding the impact of the CPEC on the region, a sociological survey was conducted, the results of which are analyzed in the articles. Statistical data on tourist flows in the province of Gilgit-Baltistan were also provided.

The structure method allowed to consider the Gilgit-Baltistan region as a unit of the administrative structure of Pakistan. Gilgit-Baltistan becomes as an object on the influence of CPEC in the system of bilateral relations between Pakistan and China with a projection on the internal policy of the state. The next level of analysis of subsystem of the study is projection on complexity of factors influencing the development of the tourism industry of Gilgit-Baltistan as a component of the national one, such as geo-political, security, cultural, religious and environmental factors. As a result of the systemic analysis of the impact of the CPEC sustainable development project on the tourism industry of Gilgit-Baltistan, both prospects and challenges were eradicated.

In order to confirm the results of the study, a sampling method was used. In international relations and foreign policy analysis, the sampling method introduced as a statistical process of selecting a subset (sampling) from a population (general sampling), for example, from all countries or citizens, in order to draw conclusions about this entire population. This allows scientists to study individual cases to understand global processes, and is a key tool for analysing big data and forming generalizations in the social sciences.

First of all, the researcher determines the general group that is investigated. Secondly, a smaller group (sampling) is selected from this population so that it is representative and reflects the characteristics of the entire group. Thirdly, research and analysis of the data obtained from the sampling are carried out.

Fourthly, the conclusions drawn from the analysis of the sampling are generalized to the entire general population, allowing us to understand trends and patterns at the global level.

A practical example of using the sampling method is the study of public opinion, in particular, polling a small group of citizens of different categories to understand the general attitude towards a certain event.

The sampling method has a certain research methodology, which is based on conducting a survey. A survey is a method of obtaining primary information based on an oral or written address to the person or group of people under study with questions which content constitutes the problem of the study. There are two main types of surveys – questionnaires and interviews. When conducting a survey, the respondent (respondent) fills out the questionnaire himself in the presence of a researcher (interviewer) or without him. According to the form of conducting it, it can be individual or group. In the latter case, a significant number of people can be interviewed in a short time. The survey is group, individual, in target audiences, face-to-face and correspondence, etc.

Opportunities for tourism sector in Gilgit-Baltistan

Economic growth

A more stable environment for investment in the tourism industry may result from the economic advantages of CPEC. There may be more money available to spend for both residents and visitors as a result of increased economic activity. The China-Pakistan Economic Corridor's potential impact on Pakistan includes economic advantages significantly. Pakistan is anticipated to gain a sizable number of jobs as a result of CPEC. This includes openings for employment in the industries of construction, logistics, and transportation, all of which will be essential during the project's development. Long-term job prospects can also be produced by the expansion of businesses and services linked to rising economic activity. CPEC can accelerate trade and investment, which will help Pakistan's economy thrive. The country will undoubtedly become easier to do business in as the transportation infrastructure advances, luring both domestic and foreign capital (Asees et al., 2020).

This may result in greater industrial output and overall economic growth. The CPEC encompasses multiple provinces and regions, promoting more equitable regional development. Pakistan now has a more direct and quick commercial channel with China and other regional nations because to the CPEC's transportation network. Pakistani goods may be more competitive in global markets thanks to shorter transit times and lower transportation costs, which could lead to higher exports. The energy projects included in CPEC are intended to fill Pakistan's energy gaps. Energy infrastructure development and power plant building can help stabilize the nation's energy supply, minimizing production disruptions and fostering industrial expansion. With regard to CPEC, the government can make money in a number of ways, including by charging tolls on newly built highways and charges for utilizing ports and transit hubs (Baig et al., 2020).

Improved Connectivity

The development of road networks and other transportation infrastructure by CPEC may increase tourists' access to previously inaccessible locations. This could open up hitherto inaccessible tourist destinations. Through CPEC, China and Pakistan will have a more effective and affordable commerce route. Increased bilateral trade between the two nations would be made possible by this connectivity, and Pakistan may even get the chance to act as a gateway for Chinese goods into the larger South Asian and Middle Eastern markets. Foreign investment may come to Pakistan as a result of improved connectivity. The infrastructural initiatives of CPEC will improve connectivity, both within Pakistan and with its neighbors.

This may encourage regional integration and cooperation, which may result in favorable economic effects from cross-border trade and cooperation on various projects. Reduced transit times and transportation costs will result from the CPEC's extensive network of highways, railroads, and ports. It's critical to handle the potential drawbacks of more connection, including environmental effects, community dislocation, and

the need for sound planning and regulation to ensure sustainable development. In order to gain the long-term benefits of enhanced connection, infrastructure must also be maintained and upgraded (Alam et al., 2021).

Job creation

Pakistan is anticipated to gain a sizable number of jobs as a result of CPEC. This includes openings for employment in the industries of construction, logistics, and transportation, all of which will be essential during the project's development. Long-term job prospects can also be produced by the expansion of businesses and services linked to rising economic activity. CPEC projects provide a sizable number of jobs during the development and construction phases. The construction of roads, infrastructure, and power plants are examples of labor-intensive activities in this category. Unskilled laborers, skilled engineers, and technicians can all find work in these positions, which cater to a diverse group of individuals (Faisal, 2019).

The Project managers, architects, civil engineers, and technicians, among others, are needed for CPEC projects. Due to a growth in demand for technical and engineering education and training, the general skill level of the Pakistani workforce may rise as a result. Pakistan must handle possible issues including labor rights, environmental concerns, and a fair distribution of work possibilities if it is to reap the benefits of job growth through CPEC. To ensure a workforce that is well-prepared to take full advantage of the employment prospects afforded by CPEC projects, investments in education and vocational training should also be in line with the skill requirements of the changing job market (Kousar, 2018).

Regional Development

Under the mega project CPEC, infrastructure development is not restricted to a certain area. It encompasses multiple provinces and regions, resulting in more evenly distributed regional development. More connectivity may result in more economic activity and higher living standards in underdeveloped places. Regional development is a key component of the CPEC, which has the ability to encourage economic growth and lessen regional inequities within Pakistan. Promoting balanced economic growth across Pakistan's diverse regions is one of the main goals of CPEC. The infrastructural development, economic possibilities, and accessibility to essential services, there have historically been large regional differences. By making investments in less developed regions, CPEC aims to reduce these inequities. The CPEC is made up of a number of development corridors that cross several Pakistani provinces and regions. The Western Route, Central Route, and Eastern Route are a few of these corridors. Each corridor seeks to promote local development by boosting economic activity in the areas it traverses (Ali, 2020).

The different Special Economic Zones will be created along the corridor as part of CPEC. These zones are intended to draw domestic and international investment, produce jobs, and advance industrialization. For instance, the Gwadar Port is anticipated to play a significant role as an economic hub in the southwest region. In several regions of Pakistan, CPEC include the building and upgrading of vital infrastructure, including roads, trains, ports, and energy facilities. This infrastructural improvement improves connections and promotes regional economies. The equitable distribution of the economic advantages of CPEC throughout all regions of Pakistan also depends on transparent governance and efficient coordination between federal, provincial, and local authorities (Durani & Khan, 2018).

Promotion and Marketing

The government may use the extra attention Pakistan is getting as a result of CPEC to promote Pakistan as a tourist destination. Through effective marketing and promotion initiatives, Pakistan can be repositioned as a safe and enticing travel destination. The development of contemporary infrastructure, including as hotels, resorts, and recreational facilities, along the CPEC route can improve Pakistan's entire tourism industry. Tourists are more likely to visit locations with plush lodging and superior services (Aman et al., 2022).

Challenges for tourism sector in Gilgit-Baltistan

Security Challenges

The first and most vital challenges in way of promote tourism is security issue. Security issues are among the biggest obstacles that Pakistan's tourism industry must overcome. Political instability and terrorism are two security challenges that the nation has occasionally faced. The expansion of the industry may be hampered by these worries turning away potential visitors. In several parts of Pakistan, particularly in the northwest border areas, there have been instances of terrorism and extremist violence (Ismail, 2022).

Both people and visitors have previously have been targeted in terrorist assaults. Tourists are scared off from visiting the country by such incidents and refrain from doing so. Regional conflicts, particularly with Pakistan's neighbor India, are a result of its geographical position. The safety of visitors near border regions may be impacted by these tensions, which occasionally cross over into border zones. Many foreign governments issue travel warnings warning their citizens against visiting particular areas of Pakistan owing to security concerns. Tourist arrivals may be greatly impacted by these warnings (Waldmüller et al., 2019).

Political instability

Political turmoil, protests, and instability can turn away tourists and damage the sector's brand. For the tourism industry to continue to grow steadily there must be ongoing political unrest. Political instability describes a condition in which a nation or area regularly and significantly encounters interruptions in its political system or government. These disruptions can take many different forms and have significant effects on the stability, security, and growth of a country. Instability and unrest can result from a lack of continuity in government. Protests, demonstrations, and social movements are frequently indicators of political unrest (Omar & Imtiaz, 2019).

These can be brought on by a number of things, such as racial or religious tensions, governmental repression, or economic inequality. Political unrest can lead to armed conflict, such as civil wars, insurrections, or interethnic conflicts. These disagreements may result in exorbitant financial and human costs. Economic instability, political instability can be exacerbated by high inflation, high unemployment, and economic disasters. People may be more likely to take part in protests or support radical political movements when they are struggling to meet their fundamental requirements (Ahmar, 2014).

Sectarian Challenges

The tensions between various religious, ethnic, or cultural groups frequently result in bloodshed, discrimination, or social instability. For instance, shia-sunni conflict since 1988. These problems can take many different shapes and have caused a great deal of worry and conflict throughout history and in many different places of the world. It is frequently necessary to take a multifaceted strategy to handle sectarian issues, which includes making an attempt to foster communication, understanding, and reconciliation amongst various groups as well as addressing the underlying socio-economic and political causes of tensions. Solving these issues requires the cooperation of international organizations, governments, and civil society organizations (Ali, 2020).

Environment challenges

Water resource availability (as a result of climatic change) as well as the security and accessibility of tourism destinations may be impacted by these changes. Preservation of cultural heritage places is crucial for sustainable tourism, yet it is not just a concern for the environment. Historic and cultural assets may deteriorate due to ineffective management and a lack of conservation initiatives (Baig et al., 2023).

Cultural challenges

The term cultural challenge in the context of Gilgit-Baltistan tourism sector refers to issues with promoting and preserving the country's rich cultural legacy while also satisfying the needs and expectations of tourists. It is possible that international tourists have different expectations from Pakistan's traditional and conservative ways. Achieving equilibrium between maintaining cultural authenticity and accommodating

visitor needs could prove to be challenging. Communication breakdowns or cultural insensitivity may result from differences in culture between visitors and the local populace. Travelers need to be made aware of local customs and traditions by tourism stakeholders in order to promote courteous encounters. Commercializing ancient practices and customs for travel-related reasons may lead to a loss of authenticity. A challenging issue is striking a balance between preserving customs and making them tourist-friendly. Linguistic difficulties may make it more difficult for visitors and locals to communicate effectively. Providing multilingual materials and interpreters could potentially bridge this divide. A careful balance must be established in the twenty-first century to manage cultural challenges in the tourism industry while promoting tourism for economic development and safeguarding Pakistan's unique and appealing cultural heritage. Working together, the corporate sector, local communities, and government agencies can overcome these challenges and ensure that tourism has a positive impact on the economy and cultural preservation (Sun, & Zhao, 2019).

Religious challenges

One of the main religious issues facing the G-B's tourism business is the need to respect and accept the country's deeply ingrained religious beliefs and practices while also embracing visitors from various cultural and religious backgrounds. Islamic traditions and customs are deeply ingrained in daily life in the historical period of Great Britain Empire, where a sizable section of the populace is Muslim. It is imperative that tourism-related activities and processes respect these customs. Mosques, shrines, and historical structures are a few of the numerous significant Muslim religious locations in the region (Habib & Iqbal, 2022).

It is difficult to strike a balance between the sacredness of these places and the ease of access for tourists. Some guests may have beliefs and customs that are at odds with the traditional Islamic principles of G-B. Promoting tolerance for different religions and respect for regional customs is crucial. The obstacles rooted in religion GILGIT can develop a tourism environment that attracts tourists from all walks of life while protecting its religious and cultural legacy by educating the public, especially the community, and upholding high standards. Maintaining regional customs and beliefs while also offering a friendly and enjoyable tourism experience must be balanced (Ismail et al., 2023).

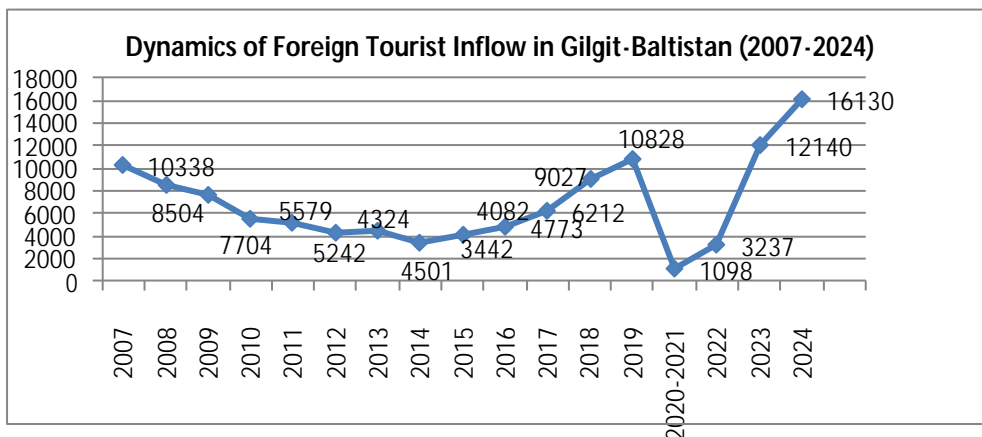
Data survey and statistics background

With the purpose to understand the level of tourism potential of Gilgit-Baltistan, an analysis of the level of tourist flows from 2007 to 2024 was conducted, according to open sources and data from the website of Tourism, Sports, Culture, Archaeology & Museums Department of Gilgit-Baltistan government. As is known, at the end of 2019, the world was shaken by the coronavirus pandemic (COVID-19), and therefore foreign tourist flows to Gilgit-Baltistan during 2020-2021 decreased significantly (several months had indicators of "0") and were low in 2022. However, since 2023 they have increased and during the studied period – in 2024 they reached 16,130 foreign visitors (Figure 3).

One of the factors for the growth of tourist flows to Gilgit-Baltistan can be considered the involvement of the region in the general scheme of development of infrastructure projects of the corridor. It is illustrating positive trend in the implementation of the CPEC project.

A more thorough cross-section of data on tourist flows in the intra-regional dimension of Gilgit-Baltistan is demonstrated in Table 2. This allows to analyze each districts of Gilgit-Baltistan regarding its prospects in the tourism sector, the possibility of correlating the relevant data on tourist flows with regional and state policies. Of course, taking into account internal and external factors, as well as natural features (cataclysms).

Figure 3



Source: based on the data from Table 1

Table 1

Foreign Tourist Inflow

Year Wise And Month Wise Foreign Tourist Inflow In Gilgit-Baltistan (2007 to 2024)													
Year	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
2007	52	74	230	580	1252	2061	1491	1562	1797	773	292	174	10338
2008	48	24	279	407	693	1317	1553	1377	964	929	552	361	8504
2009	95	52	902	337	1256	1448	1039	837	760	424	203	351	7704
2010	63	54	308	204	794	729	960	815	675	405	312	260	5579
2011	81	86	325	391	663	909	726	492	608	473	293	195	5242
2012	62	99	226	165	343	714	900	475	568	422	223	127	4324
2013	64	29	366	585	395	740	614	491	540	432	196	49	4501
2014	43	9	62	495	305	600	513	343	416	492	108	56	3442
2015	51	25	286	503	375	590	469	506	513	463	256	45	4082
2016	88	55	230	319	495	684	674	632	532	623	278	163	4773
2017	50	119	281	773	523	574	948	701	772	950	389	132	6212
2018	70	200	375	623	927	1190	1422	1663	1520	641	201	195	9027
2019	110	375	558	936	1078	1263	1577	1850	1790	754	331	206	10828
2020-21	37	60	150	0	0	0	0	0	210	356	163	102	1098
2022	71	95	196	306	195	403	350	388	393	470	202	168	3237
2023	58	96	440	687	974	1225	1680	1389	1401	3190	775	225	12140
2024	156	157	1000	2211	1394	1688	1285	1890	2040	3474	416	419	16130

Source: Tourism, Sports, Culture, Archaeology & Museums Department

Table 2

Domestic tourism data from 1st January, 2023 to 31st December, 2023

District	1 st Quarter (A)				2 nd Quarter (B)				3 rd Quarter (C)				4 th Quarter (D)			Total
	Jan	Feb	March	Total	April	May	June	Total	July	Aug	Sep	Total	Oct	Nov	Dec	
Astore	8514	8872	9372	26758	4780	6708	7615	19103	4272	4831	5709	14812	5334	5240	3370	13944
Diamer	9612	9772	14572	33956	8515	14410	21809	44734	20497	17471	9427	47395	8112	8170	5661	21943
Gilgit	10502	11412	12873	34787	5897	9162	12377	27436	6920	7513	4630	19063	6807	7070	5454	19331
Ghizer	10171	10592	11229	31992	5113	7566	10433	23112	12117	10774	9893	32784	3520	3330	2672	9522
Ghanche	622	720	920	1640	4959	5134	5500	15593	2050	2242	1473	5765	1855	2190	1810	5855
Kharomang	500	690	9985	11175	89	133	263	485	534	386	200	1120	645	1430	1256	3331
Hunza	11378	13527	18232	43137	15921	22079	43067	81067	9320	8212	5630	23162	9680	9902	8257	27839
Nagar	5294	7796	10242	23332	4470	4967	4355	13792	767	704	448	1919	4045	4540	3067	11652
Skardu	11880	17011	20901	49792	11144	12359	12975	36478	11670	10682	8422	30774	9653	9230	8336	27219
Shigar	9117	10542	13200	32859	941	1249	2272	446	2556	395	255	3206	1720	2416	2228	6364
G. Total	76968	90934	121526	289428	61829	83767	120666	266262	70703	63210	46087	180000	51371	53518	42111	147000
				A+B+C+D									882690			

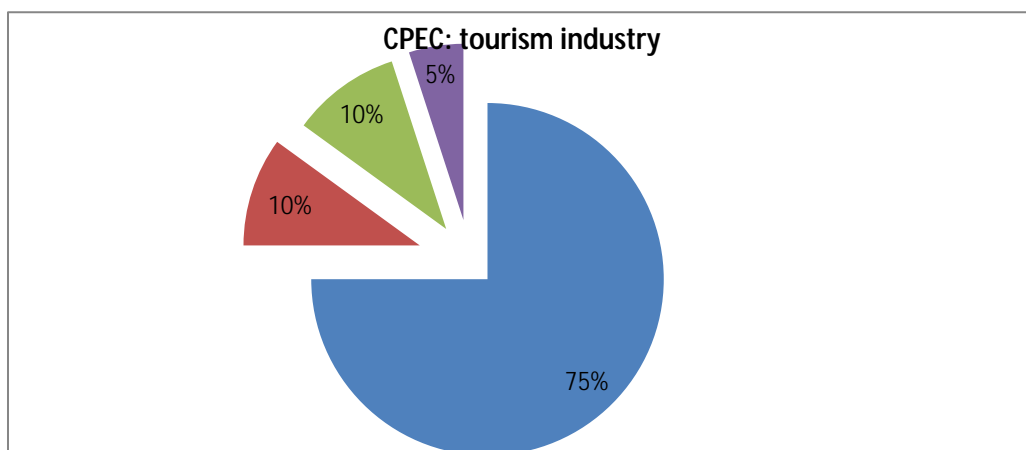
Source: *Tourism, Sports, Culture, Archaeology & Museums Department*

To assess the public’s perception of the CPEC’s results and its perception in a positive or negative light, a sociological survey was conducted. The research uses the sampling method via public opinion poll on the example of students of the Karakorum International University and rest of stake holder in different sector of Gilgit-Baltistan. . Therefore, from the youth of Gilgit-Baltistan (the general sampling), a group of different stake holder and students from the Karakorum University was selected. This group of students and stake holder with the purpose to form the general attitude of the youth of the region to the issue raised in article, was asked about their attitude to the CPEC and its impact on the tourism sector of Gilgit-Baltistan. Of course, the number of respondents participated in poll can raised a question about certain error and issue of verification in the statistical study, but overall it can be a representative indicator of a local study of public opinion.

A research study conducted in Karakoram international university (KIU), and stake holder of Gilgit in 2024 among 120 students and stake holder (50 males, 50 female and 20 stake holder). The representatives were asked: “How important do you think the China Pakistan Economic Corridor is for Pakistan’s development, job opportunities, reducing unemployment in tourism industry?”

Figure 4

Assessment of the CPEC’s impact on the development of the Gilgit-Baltistan’s tourism industry



Source: *conducted poll by authors.*

The respondents were asked such question: “Do you believe that CPEC is fruitfully for the industries development in Gilgit-Baltistan?” They were proposed several answers: a) Yes, I believe that China-Pakistan economic corridor can’t bring development and creations job for local peoples; b) No, I

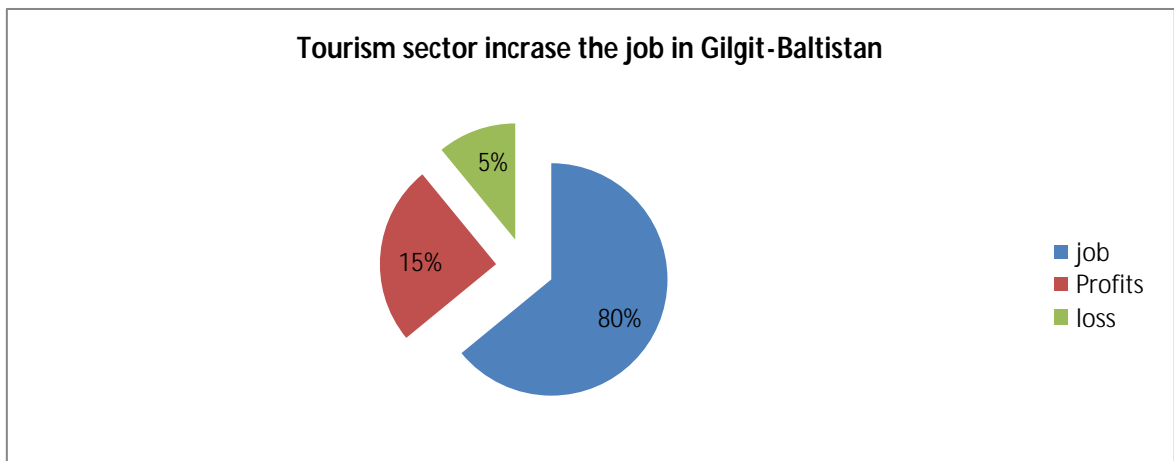
don't believe that China-Pakistan economic corridor can't bring development and creations job for local peoples; c) It may be development and overcome energy crisis in Pakistan; d) I do not know exactly.

Analysis of Questionnaires data (Figure 4)

A survey among students at the Karakoram International University (KIU) and stake holder came up with the fact that the overwhelming majority (75%) are of the opinion that the China-Pakistan Economic Corridor (CPEC) will greatly benefit the development of the tourism industry of Gilgit-Baltistan, thus enhancing the economy of Pakistan, generating job opportunities, and rendering direct benefit to the locals. Contrarily, 10% of the students / stake holder do not opine that CPEC will trigger development or provide jobs for local people, whereas 5% view it as a project that can assist in development and alleviating Pakistan's energy crisis. In the meanwhile, yet another 10% of students confessed that they were not aware of the project and its implications.

Figure 5

Indicators of defining the improvement of Gilgit-Baltistan's tourism industry



Source: conducted poll by authors.

Due to the flow of international and national tourist peoples in G-B, there is created jobs opportunities in hotel industry and fruits center in different area of G-B. Respondents were asked such question: "Do you believe that CPEC Created Job in Gilgit-Baltistan regard tourism industries?" They were proposed several answers: a) Yes, due to tourism industry jobs are increase b) I hope for the profits of local peoples by tourism sector c) due to the tourism sector there is a loss of natural beauty, environment issue and created cultural issue in G-B.

Analysis of Questionnaires data (Figure 5).

The findings of questionnaire analysis (Figure 4.) show that most KIU students/ stake holder (80%) are of the opinion that the increasing influx of national and foreign tourists to Gilgit-Baltistan has provided substantial employment opportunities, especially in hotels and fruit markets in various regions of the region. Moreover, 15% of students / stake holder were optimistic that development of tourism would yield economic benefits and direct gains to the local inhabitants. But a smaller percentage, about 5%, were concerned that the tourism growth could result in loss of natural beauty, environment degradation, and cultural issues in Gilgit-Baltistan.

Recommendations and Conclusions

According to the study's findings, G-B's sustainable development, especially the travel and tourist industry, can be facilitated by the massive CPEC. But in order to overcome obstacles and take advantage of opportunities, good management and planning are essential. In order to develop a balanced and sustainable

tourist sector that will ultimately benefit the nation, it is critical that all relevant parties the government, regional communities, and private businesses-work together.

A game-changer for Pakistan's tourism industry, the CPEC presents a plethora of chances for growth and development. Nevertheless, in order to effectively utilize these prospects, care must be taken to overcome the many potential problems. The promise of increased connectivity, economic expansion, and a variety of tourism options must be balanced against pressing issues including security worries, infrastructure development, environmental damage, and cultural preservation. To fully realize the tourism potential of CPEC and ensure long-term, sustainable growth in Pakistan's tourism sector, sustainable development, careful planning and coordination between the public and private sectors are crucial.

The tourism sector in Pakistan has a better future thanks to CPEC. Tourists may be able to visit Pakistan's numerous landscapes, from the towering Himalayas to the tranquil beaches along the Arabian Sea, with more ease because to the improved connectivity made possible by CPEC's infrastructural developments. In addition to enhancing local economies, generating jobs, and raising the living standards of towns along the corridor, this greater accessibility may also encourage domestic and foreign travel. The building of top-notch hotels, eateries, and tourism-related services is likely to follow as infrastructural development moves forward and draws investors and entrepreneurs. This has the potential to significantly improve the entire tourist experience and promote return trips. Pakistan's extensive cultural and historical legacy is set to gain from CPEC.

A stronger understanding of Pakistan's rich history and different cultures can be fostered by the newfound accessibility to historically significant locations, which may attract heritage and cultural visitors. The difficulties that lie ahead must be recognized. Potential tourists have long been discouraged from visiting Pakistan because of security concerns. For the tourism sector to expand, the government must be committed to safeguarding the safety and security of both domestic and foreign tourists. While CPEC improves infrastructure, tourism-specific facilities and services require coordinated planning and investment.

As the tourism industry grows, it is important to strike a fine balance between showcasing Pakistan's distinctive culture and legacy and avoiding cultural dilution and exploitation. It is critical to put rules and regulations into place to protect regional customs and cultures while promoting ethical travel. In terms of economic growth, cultural enrichment, and environmental preservation, CPEC offers Pakistan's tourism industry a transformative potential. The government, business community, and local communities must work together, though, in order to realize this promise. Pakistan may establish itself as a top travel destination and make a big contribution to its long-term sustainable development by addressing security issues, making infrastructure investments, applying sustainable practices, and protecting cultural assets. The road ahead may be difficult, but Pakistan's tourism industry and the country as a whole will reap enormous benefits. CPEC has the ability to alter Pakistan's tourist sector in terms of economic development, cultural amplification, and environmental preservation. To fulfill this promise, however, requires collaboration between the federal government, private sector, and local communities.

Through the security, challenges, investing in infrastructure, implementing sustainable practices, and safeguarding cultural assets, Pakistan may become a top travel destination and significantly contribute to its long-term sustainable growth. However, there is a danger of cultural exploitation as tourism expands. Pakistan must strike a careful balance between highlighting its own culture and heritage and avoiding commercialization, The CPEC and Pakistan's tourist industries coming together offers the country an once-in-a-lifetime chance. It has the ability to promote cultural awareness, advance economic development, and protect the world's natural beauties. The government, the corporate sector, and regional communities must work together strategically and purposefully to realize this promise. Pakistan can become a top travel destination by addressing security issues, making sustainable infrastructure investments, and protecting

cultural heritage. This would help Pakistan advance toward sustainable growth and prosperity over the long run.

Policy Recommendations

The following policy recommendation for the enhance of the tourism industry in Gilgit-Baltistan.

Sustainable Tourism Infrastructure Development

Policy regulation based on the National Tourism Policy (2019), Pakistan Vision 2025, as well as the Public Private Partnership Authority Act (2017). Creations of funds within the framework of the China-Pakistan Economic Corridor (CPEC) which will support financially different projects.

Community Participation and Skill Development

Regulatory and legal framework based on Pakistan Tourism Coordination Board Act. Assistance from the state authorities in providing grants to local communities in order to involve them in the development of the region's tourist attractiveness (support for folk art, crafts) its uniqueness and an element of the national image.

Environmental Protection and Regulation

Implementation within the framework of the national environmental policy based on the Pakistan Environmental Protection Act (1997), National Climate Change Policy (2012), which will contribute to the development of tourist zones in accordance with generally worldwide accepted standards, the use of renewable sources of energy.

Promotion of Cultural and Heritage Tourism

Regulatory framework based on Antiquities Act (1975), National Culture Policy (2005) will encourage certain restoration works of historical and cultural monuments of the region, their preservation. Provision of appropriate grants for the formation of museums and separate institutions to popularize the cultural and historical heritage of Gilgit-Baltistan among tourists.

Integrated Tourism Governance under CPEC

Based on the Agreement on CPEC (2015), Special Economic Zones Act (2012), attracting joint Chinese-Pakistani investments in the region with an emphasis on the tourism industry. Creation of a Tourism Industry Development Plan and relevant grant proposals.

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Analyzing Multidimensional Poverty in Roma Settlements: A WEFE Nexus and Machine Learning Approach

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This study aims to analyze multidimensional poverty determinants within Roma settlements in Serbia, North Macedonia, and Montenegro using logistic regression and machine learning to identify the socioeconomic and resource-based components influencing poverty within the WEFE (Water Energy Food Ecosystems) Nexus. Reliable lighting, sanitation maintenance, safe water access, consistent water supply, and energy for cooking all play a critical role in poverty alleviation. Our key findings align with SDG 1 (No Poverty), SDG 6 (Clean Water and Sanitation), and SDG 7 (Affordable and Clean Energy), underscoring the global significance and relevance of our research. Random Forest and Extra Trees perform very well when compared to logistic regression by capturing highly variable interactions that may be missed by logistic regression. Results with country-specific emphases are presented, such as digital access in Montenegro and household size in North Macedonia, to illustrate the adaptability of the WEFE framework to different regional contexts. The results advocate for resource-driven integrated policies to improve people's access to important utilities, financial inclusion, and digital connectivity to build social sustainability and resilience. The study supports NexusNet's plan to lead SDG-aligned poverty reduction in all sectors in the Western Balkans by focusing on WEFE resources and socio-economic supports .

Keywords: WEFE nexus, multidimensional poverty, machine learning, logistic regression, SDGs, roma settlements, Western Balkan, social sustainability

Multidimensional poverty is a deeply embedded problem in the Western Balkans where many vulnerable groups, in particular the Roma communities¹ in the region, suffer from very widespread deprivations in several dimensions (e.g., lack of access to water, energy, and food) (Morar et al., 2004). Such intersecting deprivations are often left out of traditional poverty measures, which are based on income. For this, a multidimensional approach taking into account the social, economic, and environmental facets is needed. More recent advancements in the Water, Energy, Food, and Ecosystems (WEFE) Nexus paradigm and machine learning provide more promising possibilities for enhanced poverty analysis and intervention strategy. This study, which aims to develop sustainable solutions for poverty alleviation around Roma settlements located in Serbia, North Macedonia and Montenegro, is firmly aligned with the United Nations Sustainable Development Goals (SDGs). This alignment, particularly with SDG 1 (No Poverty), SDG 6 (Clean, Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities), underscores the relevance and importance of the study.

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¹ The Roma community, also known as Gypsies, are a traditionally nomadic ethnic group originating from India who migrated to Europe between the 5th and 10th centuries A.D. Distinct cultural practices and languages characterize them and have faced historical marginalization.

The WEF Nexus framework, a comprehensive approach, serves as a starting point to understand how interdependencies between water, energy, food, and natural ecosystems create poverty and constrain resource access. It integrates resource management to promote efficiency and sustainability, thereby directly supporting SDG 6 on access to essential resources, SDG 7 and 15. The structured nature of the WEF Nexus will be of benefit to marginalized Roma communities who traditionally face resource scarcity and inequities, which can be addressed within the framework of the WEF Nexus (Ivanov et al., 2015; El-Meligi, et al., 2024). Focusing on the equitable distribution of resources, this framework is a key player in reducing vulnerability to health, education, and livelihood, thereby ensuring the social sustainability of Roma settlements (Cheng, 2019; UNECE, 2022).

The Multidimensional Poverty Index (MPI) enhances the WEF Nexus by introducing a complementary measure of poverty, focusing on deprivations in health, education, and living standards (Alkire & Foster, 2011). This is in line with SDG 1, which views poverty as a multidimensional issue necessitating comprehensive intervention strategies. The MPI's ability to reveal overlapping deprivations is particularly beneficial for the Roma settlements, which face a range of issues, including inadequate sanitation, substandard housing, and low educational levels, all of which contribute to the persistence of poverty (Ivanov et al., 2015; Ahmadi et al., 2024). However, it's important to note that the MPI, while powerful, is not fully equipped to account for the intricate nature of multi-layered poverty. This is where machine learning steps in, offering a potential solution to this complex issue.

Machine learning models can analyze complex, multidimensional datasets to reveal hidden patterns and determinants of poverty. This makes machine learning models highly attractive for development policy (Salas-Rojo & Rodríguez, 2022). These models capture the non-linearity and the interaction effects, improve poverty prediction, and uncover important poverty determinants (Lekobane & Samboma, 2024). The value of this analytical depth is especially relevant for WEF Nexus-type interventions because machine learning models can prioritize poverty drivers within Roma communities, which can help inform, in turn, the more precise and effective use of resources. Robust predictive performance of ensemble models such as the Random Forest, Extreme Gradient Boosting, XG Boost) has been found to yield insights that harmonize with SDG 10 on resource access inequalities (Cheng, 2019).

This research takes the WEF Nexus, machine learning, and MPI together and applies them to the analysis of poverty determinants in Roma settlements situated in Serbia, North Macedonia, and Montenegro. This research examines resource disparities to identify how poverty results from these disparities and how resource-based interventions aimed at poverty reduction can make a difference in Roma communities. Within the WEF Nexus framework, we implement machine learning approaches that allow for data-driven SDG 1 strategies and emphasize the significance of equitable access to water, energy, and sanitation as in line with SDG 6 and SDG 7. In the end, this serves to support the implementation of sustainable, inclusive development pathways in addressing the socio-economic problems of marginalized populations in Western Balkans in line with SDG 11 and SDG 15.

Overall, this study presents a way to tackle multidimensional poverty using a new approach: the combination of the WEF Nexus framework, MPI, and machine learning. Comprising relationships between resource dependencies and socio-economic factors, it offers a one-stop view of poverty. Finally, the study focuses on resource access inequalities and its deployment of advanced predictive analytics to provide actionable insights for policymakers and practitioners interested in reducing poverty and achieving sustainable development in Roma settlements.

Literature Review

Roma settlements across Serbia, North Macedonia, and Montenegro suffer from multidimensional poverty, which is alleviated through the use of integrated approaches. By focusing on communities facing resource inequalities employing the WEF Nexus framework, MPI, and machine learning, this study lays out

a solution. Together, these tools provide a structured approach to social sustainability and poverty reduction aligned with related SDGs

WEFE Nexus framework indicates the interconnectivity of water, energy, food, and ecosystems for better and more efficient usage on an integrated basis (Al-Saidi & Elagib, 2017; El-Meligi, et al., 2024). This provides a comprehensive approach to addressing multidimensional poverty for Roma communities, most of which are subject to considerable resource constraints. The Nexus framework closely supports SDG 6, 7, and 15 by supporting efficient resource use (Bazilian et al., 2011). Research has shown that the inefficiencies caused by the separate management of resources are overcome by WEFE-based frameworks (Ringler et al., 2013; Rasul, 2016), which lead to equitable distribution of resources that help mitigate poverty. The Nexus can contribute to reducing poverty in underserved areas through improved provision of key resources that are important to meet SDG 10 (Cheng, 2019; UNECE, 2022;). Through the Nexus framework, such socio-economic inequities that perpetuate the deprivation in Roma settlements are supported in resource allocation and decision-making as it addresses the community's inherent need for socio-economic sustainability (Rochovská, & Rusnáková, 2018; Orton et al., 2019; Ahmadi et al., 2024).

The Multidimensional Poverty Index (MPI) combines poverty with measures of deprivations in notions of health, education, and living standards (Alkire & Foster, 2011; Alkire & Santos, 2013). WEFE Nexus approach with poverty complexity and interconnectivity is completed by this approach (Mikula et al., 2018). MPI assessments in the Western Balkans document significant disparities, especially in Roma settlements, where communities suffer severe deprivation in sanitation, housing, and education (Matlovičová et al., 2022; Ahmadi et al., 2024; Rashid, & Kulub, 2026).

Through the integration of MPI and WEFE resources, these deprivations can be alleviated in a targeted manner, which contributes to UNECE's key environment infrastructure policies and SDGs 6 and 7 (UNECE, 2022). This framework aligned with SDG 1 because it uses resource-based, socially sustainable interventions to tackle poverty issues (El-Meligi, et al., 2024).

By processing complex, multidimensional data, machine learning not only identifies key poverty determinants but also extends the notion of symptom detection towards poverty. This enables the practical application of machine-learned poverty analysis (Jean et al., 2016; Lekobane et al., 2024). Ensemble models such as Random Forest, Extreme Gradient Boosting, and XG Boost, particularly useful for understanding Roma settlement poverty dynamics, are effective in uncovering non-linear relationships and interactions between poverty factors (Cheng, 2019; Hassan, 2024).

Using machine learning models, the WEFE Nexus framework sorts feature importance, which allows policymakers to use data-driven insights on what to prioritize with resources. Machine learning's predictive capabilities align with and support SDGs 6 and 7, where machine learning's predictive ability is directed to urgent needs such as the demonstration of 'access' to water, energy, and sanitation (Rasul, 2016; Salas-Rojo and Rodríguez, 2022; El-Meligi et al., 2024). SDG 10 is supported, as is resource access inequality among marginalized communities (Orton et al., 2019; Matlovičová et al., 2022; Lekobane et al., 2024).

Water, sanitation, energy, and food are essential resources for reducing poverty and social sustainability (Bazilian et al., 2011; Ringler et al., 2013; Trbojević et al., 2024). Better health and education and better economic outcomes, all of which are fundamental to breakdown cycles of deprivation in Roma settlements, are associated with better resource access (Orton et al., 2019; UNECE, 2022). By supporting SDG 1, enhanced resource access can increase productivity and well-being, which can be the part of poverty alleviation (Cheng, 2019).

Drawing from resource-based strategies, the WEF Nexus framework advocates for policies and strategies that ensure resilience and social equity and promote equal opportunity (Al-Saidi & Elagib, 2017; El-Meligi et al., 2024). This study examines resource access disparities in Serbia, North Macedonia, and Montenegro and targets interventions that can directly alleviate local socio-economic circumstances to a degree while making progress towards aligned SDGs (Trbojević et al., 2024).

This study presents a holistic framing of poverty's socioeconomic dynamics using an integrated WEF Nexus framework and machine learning. The Nexus builds upon integrated resource management to achieve SDGs and machine learning facilitates data-driven insights on poverty determinants (UNECE, 2022; El-Meligi et al., 2024). Machine learning helps identify resource gaps in Roma settlements, so targeted interventions can guide policymakers toward effective poverty alleviation strategies (Jean et al., 2016; Lekobane et al., 2024).

However, a conspicuous gap in the research exists on how the integrated WEF Nexus, MPI, and machine learning approaches can achieve robust long-term poverty reduction as they relate to the particular socio-cultural needs of Roma communities. This gap, which urgently needs to be addressed, is hindering the creation of sustainable, context-based strategies that will effectively reduce poverty while also elevating Roma settlements to resilient social pathways toward social equity and inclusion.

Method

As a primary analytical tool, we used the Multidimensional Poverty Index (MPI) to measure multidimensional poverty across Roma settlements in Serbia, North Macedonia, and Montenegro in order to make accurate measurements. Using Alkire and Foster's (2011)² Framework, we are able to assess simultaneously poverty along multiple dimensions of education, health, and living standards using the MPI framework. To conduct this household-level analysis, we used a multiple indicator cluster survey (MICS)³, which is a reliable cross-country dataset specifically designed to assess a wide range of health, education, and socioeconomic indicators. MICS data provide a consistent framework for the analysis of household-level deprivations among these Roma populations at a time when there are losses in the comparability of measurement across these populations in other datasets.

Data

The Multiple Indicator Cluster Survey (MICS) is the primary dataset used for this study, a globally recognized demographic and health survey developed by UNICEF and the United Nations Development Program (UNDP). MICS gathers information on a range of indicators, including mortality, nutrition, maternal and child health, water and sanitation access, reproductive health, child development, and education, as well as on socioeconomic conditions and healthy well-being. MICS was initially conceived as a method to monitor the Millennium Development Goals (MDGs) but is now a key tracking instrument of progress towards the Sustainable Development Goals (SDGs). Its role in tracking progress towards the SDGs underscores its importance and makes it an ideal source from which to construct the MPI in Roma settlements, where multidimensional poverty is primarily driven by a lack of access to clean water, energy, sanitation, and educational opportunities.

Three MICS surveys, each with a substantial sample size, were conducted in Roma settlements to gain insights from marginalized communities. These surveys provide cross-nationally comparable measures of deprivation at the household level, including the extent of deprivation in Roma communities. In Serbia's

²Alkire, S., & Foster, J. (2011). *Counting and multidimensional poverty measurement*. *Journal of Public Economics*, 95(7-8), 476-487. doi: 10.1016/j.jpubeco.2010.11.006

³ <https://mics.unicef.org/>

MICS 2019⁴, a total of 1,934 households (8,329 people) participated, with an impressive response rate of 96.8 percent. The MICS 2018-19⁵ in North Macedonia sampled 6,249 individuals in 1,584 households, with a response rate of 94.2 percent, while the MICS 2018⁶ in Montenegro included 4,732 individuals in 1,165 households, with a response rate of 80.9 percent.

Although the MICS surveys provide an important and comparatively consistent basis for household-level analysis in Roma settlements, the sample composition still requires cautious interpretation. In particular, differences in the urban-rural distribution of surveyed households and variation in country-specific sample sizes may influence the precision and comparability of the estimates. For this reason, the findings should be interpreted primarily as applying to the surveyed Roma settlements included in the MICS samples rather than as automatically representative of all Roma communities in the Western Balkans. This consideration is especially important where settlement conditions, infrastructure access, and deprivation profiles differ between urban and rural locations.

Area of Study

The study focuses on Roma settlements within three Western Balkan countries: North Macedonia and Montenegro. Roma and a number of these nations share a history of similar socio-economic development, which is subject to study in order to arrive at the determinants of poverty in Roma communities. Systemic inequalities in resource access and social inclusion dominate Roma settlements in these countries, and as such, they are essential for understanding poverty and developing targeted interventions (Bieber, 2005; Rodríguez-Pose & Stermšek, 2015; World Bank, 2019).

A Machine Learning Model Selection and Validation

In addition to logistic regression, several supervised machine-learning models were evaluated to predict multidimensional poverty across Roma settlements in Serbia, North Macedonia, and Montenegro. The comparative modelling framework included Decision Tree, Support Vector Machine, Logistic Regression, Gradient Boosting, AdaBoost, XGBoost, LightGBM, Random Forest, and Extra Trees. Among these, Random Forest and Extra Trees were selected as the principal models for interpretation because they are particularly appropriate for datasets characterized by heterogeneous socio-economic and WEFE-related predictors, potential non-linear relationships, and interaction effects among variables. These ensemble tree-based approaches are also comparatively robust in handling complex classification tasks and provide a useful basis for identifying the relative importance of predictors in multidimensional poverty analysis.

Model performance was assessed using a cross-validation-based evaluation procedure in order to reduce the risk of overfitting and improve the reliability of model comparison. Hyperparameter tuning was undertaken to optimize model specifications and to identify the best-performing configurations for each algorithm. The final emphasis on Random Forest and Extra Trees was based not only on their strong predictive performance across the three country settings, but also on their relative stability and interpretive usefulness in the context of policy-oriented poverty analysis.

Operationalization of the WEFE Nexus in the Empirical Framework

The WEFE Nexus framework was operationalized in this study as the conceptual basis for identifying and interpreting key household resource conditions linked to multidimensional poverty. In practice, this meant that variables related to water, energy, and sanitation-related service conditions were selected as core

⁴ Statistical Office of the Republic of Serbia and UNICEF. 2020. Serbia Multiple Indicator Cluster Survey and Serbia Roma Settlements Multiple Indicator Cluster Survey, 2019, Survey Findings Report. Belgrade, Serbia: Statistical Office of the Republic of Serbia and UNICEF.

⁵ State Statistical Office and UNICEF. 2020. *2018-2019 North Macedonia Multiple Indicator Cluster Survey and 2018-2019 North Macedonia Roma Settlements Multiple Indicator Cluster Survey, Survey Findings Report*. Skopje, North Macedonia: State Statistical Office and UNICEF.

⁶ Statistical Office of Montenegro (MONSTAT) and UNICEF. 2019. *2018 Montenegro Multiple Indicator Cluster Survey and 2018 Montenegro Roma Settlements Multiple Indicator Cluster Survey, Survey Findings Report*. Podgorica, Montenegro: MONSTAT and UNICEF.

explanatory dimensions because they reflect the resource-access logic central to the WEFE perspective. The Multidimensional Poverty Index (MPI) was used as the poverty measurement framework and provided the basis for constructing the binary dependent variable, through which households were classified as multidimensionally poor or non-poor. Logistic regression and machine-learning models were then applied to examine how WEFE-related variables, together with socio-economic predictors, are associated with that poverty outcome. The WEFE-related variables were not assigned separate manual weights in the machine-learning models, nor was any ex-ante prioritization imposed during model estimation. Rather, the WEFE framework informed the substantive selection of predictors, while their relative importance was determined empirically through model estimation, comparative model performance, and feature-importance analysis.

This methodological structure provides the basis for the subsequent empirical analysis by linking the conceptual role of the WEFE Nexus, the poverty-classification role of the MPI, and the explanatory role of the regression and machine-learning models.

Results and Discussion

Table 1

The dimensions, indicators, deprivation cut-offs, and weights of the Multidimensional Poverty Index

Dimensions of poverty	Indicator	Deprived of...	Weight
Education	Years of Schooling	No household member has completed five years of schooling.	1/6
	Child School Attendance	Any school-aged child is not attending school up to class 8.	1/6
Health	Child Mortality	Any child has died in the family.	1/6
	Nutrition	Any child for whom there is nutritional information is malnourished.	1/6
	Electricity	The household has no electricity.	1/18
Living Standard (LS)	Improved Sanitation	The household's sanitation facility is not improved (according to MDG guidelines) or improved but shared with other households.	1/18
	Improved Drinking Water	The household does not have access to improved drinking water (according to MDG guidelines), or safe drinking water is more than a 30-minute walk from home, roundtrip.	1/18
	Flooring	The household has a dirt, sand, or dung floor.	1/18
	Cooking Fuel	The household cooks with dung, wood, or charcoal.	1/18
	Assets ownership	The household does not own more than one telephone, mobile phone, radio, TV, bicycle, motorcycle/ scooter, car/ truck or animal driven cart or refrigerator, livestock (no cattle, no horse, less than two goats, or less than ten chicken).	1/18

Table 2

Multidimensional Poverty Index (MPI) and its Indices across Roma Settlements in Serbia, Roma Settlements, and Montenegro

Roma Settlements	MPI			Poor Population (%)			Intensity (%)		
	Overall	Rural	Urban	Overall	Rural	Urban	Overall	Rural	Urban
Serbia	3.95	4.27	3.79	10.11	10.80	9.74	39.13	39.52	38.91
North Macedonia	2.39	1.54	2.44	6.25	3.71	6.40	38.28	41.43	38.17
Montenegro	6.26	1.79	7.12	13.51	5.36	15.07	46.34	33.33	47.22

Table 2 Described the MPI and poverty indices in Roma settlements across Serbia, North Macedonia, and Montenegro, where Montenegro is facing the highest MPI not only overall but also among urban and rural areas. Overall, MPI and its indices are higher across Roma communities, indicating poverty, including

Belgrade				Vardar			South		
Reference				Reference			Reference		
Vojvodina	1.62	0.338	0.021**	East (1.051)	0.904	0.953	Centre (.155)	0.079	0***
Sumadija and Western Serbia	0.842	0.202	0.475	South West (.380)	0.355	0.3	North (.183)	0.093	0.001***
Southern and Eastern Serbia	0.578	0.11	0.004***	South East (-)	-	-	Constant (37.411)	35.434	0***
Constant	78.163	43.59	0***	Pelagonija (3.123)	2.722	0.191			
				Polong (.306)	0.281	0.198			
				North East (2.336)	2.148	0.356			
				Skopje (2.519)	2.125	0.273			
				Constant (65.953)	65.959	0***			
Mean dependent var	0.077						0.117		
Pseudo r-squared	0.448						0.339		
Chi-square	1668.25						385.467		
Akaike crit. (AIC)	2093.581						793.264		
SD dependent var	0.266						0.321		
Number of obs	6876						1579		
Prob > chi2	0						0		
Bayesian crit. (BIC)	2237.133						905.919		

Note: Odds ratios are interpreted relative to the stated reference category for each variable.

Values above 1 indicate higher odds of multidimensional poverty relative to the reference group, whereas values below 1 indicate lower odds.

After constructing the MPI, we used binary logistic regression⁷ to analyze the socio-economic factors influencing multidimensional poverty. Households with a deprivation score C_i equal to or above the cut-off $k = 33\%$ were identified as multidimensionally poor, while those below the cut-off were classified as non-poor. This approach provides a useful framework for examining the correlates of multidimensional poverty across Roma settlements (Mohammed & Ab-Rahim, 2021; Ogwang, 2022; Abdiwahab, Menza, & Mohamed, 2024).

The logistic regression analysis for Roma settlements in Serbia, North Macedonia, and Montenegro reveals important socio-economic and resource-based correlates of multidimensional poverty within the WEF Nexus framework. In particular, the analysis highlights the relevance of key resource-related variables, including electric lighting access, sanitation facility emptied, improved water access, reliable water supply, and cooking fuel deprivation, in relation to SDG 1, SDG 6, and SDG 7.

Electric lighting access shows a strong negative association with multidimensional poverty across all three countries, with odds ratios below 1 in Serbia (odds = 0.059, $p < 0.001$), North Macedonia (odds = 0.016, $p < 0.001$), and Montenegro (odds = 0.100, $p < 0.001$). This indicates that households using electricity for lighting are less likely to be multidimensionally poor than those relying on other lighting sources. At the same time, this relationship may also reflect broader differences in service access, housing quality, and infrastructure security within Roma settlements (El-Meligi et al., 2024).

⁷ Alkire, S., Foster, J. E., Seth, S., Santos, M. E., Roche, J. M., and Ballon, P. (2015). *Multidimensional Poverty Measurement and Analysis*. Oxford: Oxford University Press, ch. 10.

$$F(X'\beta) = \frac{e^{X'\beta}}{1 + e^{X'\beta}} = \frac{\exp(X'\beta)}{1 + \exp(X'\beta)}, C_i \geq k \text{ MPI Poor}, C_i < k \text{ MPI Non-Poor. Multidimensional Poor Household} = \begin{bmatrix} 0 & \text{If No} \\ 1 & \text{If Yes} \end{bmatrix}$$

The odd ratio or relative risk is $\frac{P}{(1-p)}$ are measures the probability that $y=1$ relative to the probability that $y=0$

$$P = \frac{\exp(X'\beta)}{1 + \exp(X'\beta)}, \frac{P}{(1-p)} = \exp(X'\beta), \ln \frac{P}{(1-p)} = X'\beta$$

The sanitation-related results also require cautious interpretation and differ across countries. In Serbia, sanitation facility emptied is positively associated with multidimensional poverty (odds = 1.704, $p < 0.001$), whereas in Montenegro the association is negative and statistically significant (odds = 0.158, $p = 0.003$). By contrast, the coefficient for North Macedonia is not statistically significant and therefore should not be interpreted as a robust effect. These differences suggest that the sanitation variable may reflect different underlying conditions across country contexts, including variation in infrastructure quality, maintenance practices, settlement form, and service provision, rather than a single uniform sanitation-poverty relationship (Matlovičová et al., 2022; UNECE, 2022).

Improved water access is also an important factor, particularly in Montenegro, where the odds ratio is strongly below 1 (odds = 0.067, $p < 0.001$), indicating a negative association with multidimensional poverty. This suggests that households with improved water access are less likely to experience overlapping deprivations, although the observed association may also reflect broader advantages in infrastructure provision, service reliability, and settlement conditions rather than the isolated effect of water access alone (Lange, 2018; Cheng, 2019; Zisopoulou & Panagoulia, 2021).

Reliable water supply displays a more context-specific pattern. In North Macedonia, the odds ratio is above 1 (odds = 2.036, $p < 0.001$), while the corresponding coefficients in Serbia and Montenegro are not statistically significant. This suggests that the relationship between reliable water supply and multidimensional poverty may be shaped by country-specific infrastructure arrangements, settlement characteristics, and service conditions rather than following a uniform pattern across the three study settings (Rodríguez-Pose & Sternšek, 2015).

The odds ratios for cooking fuel deprivation require particular attention. In Serbia (odds = 6.105, $p < 0.001$), North Macedonia (odds = 13.768, $p < 0.001$), and Montenegro (odds = 4.892, $p < 0.001$), the results indicate that households experiencing cooking fuel deprivation have substantially higher odds of multidimensional poverty relative to the reference category. This association likely captures broader forms of structural disadvantage, including limited access to clean energy infrastructure, lower housing quality, financial constraints, and settlement-level exclusion, rather than the isolated effect of cooking fuel alone (Bouzarovski, 2017; Rasul, 2023).

Several socio-economic variables also emerge as important correlates of multidimensional poverty. In North Macedonia, having a bank account is negatively associated with poverty (odds = 0.293, $p < 0.001$), suggesting that households with access to formal financial services are less likely to be multidimensionally poor. Similarly, internet access is negatively associated with poverty across all three countries, reinforcing the link between connectivity, access to opportunities, and social inclusion in marginalized communities (Choudrie et al., 2018; Yakubi et al., 2022; Kovač et al., 2024). The number of rooms in the household is also consistently negatively associated with poverty, suggesting that better housing conditions are linked to improved living standards (Vuksanović-Macura, 2012; Vuksanović-Macura & Mišević, 2021).

Other household-level factors show more context-dependent effects. For example, a male household head is negatively associated with multidimensional poverty in Serbia (odds = 0.613, $p = 0.002$), but positively associated with poverty in North Macedonia (odds = 5.201, $p < 0.001$), while in Montenegro the relationship is weaker though still positive (odds = 1.971, $p = 0.037$). Similarly, urban area is negatively associated with poverty in Serbia (odds = 0.383, $p < 0.001$), but positively associated in Montenegro (odds = 7.739, $p < 0.001$), indicating that the social and spatial determinants of deprivation differ across the three country settings. These contrasts suggest that household structure, settlement patterns, and local opportunity structures may shape poverty in different ways across Roma communities.

Overall, the logistic regression findings should be interpreted as associational rather than causal. Several WEF-related variables likely capture broader latent dimensions of deprivation, including infrastructure deficits, housing precarity, service exclusion, and chronic socio-economic disadvantage within Roma settlements. Accordingly, the odds ratios reported in Table 3 are best understood as indicators of how specific household conditions are statistically linked to multidimensional poverty, rather than as direct estimates of the isolated causal effect of a single factor.

Table 4

Comparative Performance of Machine Learning Models across Roma Settlements in Serbia, North Macedonia, and Montenegro

Serbia (Roma Settlements)									
	Random Forest	Decision Tree	SVM	Logistic Regression	Gradient Boosting	Ada Boost	XG Boost	Light GBM	Extra Trees
Accuracy	0.998547	0.998547	0.941134	0.946221	0.962209	0.946948	0.998547	0.998547	0.998547
Precision	0.979798	0.979798	0.863636	0.709091	0.894737	0.706897	0.979798	0.979798	0.979798
Recall	1	1	0.195876	0.402062	0.525773	0.42268	1	1	1
F1-Score	0.989796	0.989796	0.319328	0.513158	0.662338	0.529032	0.989796	0.989796	0.989796
ROC AUC	0.999976	0.999992	0.92133	0.927239	0.969556	0.949203	0.999976	0.999992	0.999992
North Macedonia (Roma Settlements)									
Accuracy	0.995079	0.996063	0.951772	0.951772	0.969488	0.950787	0.995079	0.995079	0.996063
Precision	1	1	0.823529	0.761905	0.97619	0.733333	1	1	1
Recall	0.929577	0.943662	0.394366	0.450704	0.577465	0.464789	0.929577	0.929577	0.943662
F1-Score	0.963504	0.971014	0.533333	0.566372	0.725664	0.568966	0.963504	0.963504	0.971014
ROC AUC	0.998174	0.971831	0.950876	0.960176	0.983732	0.967598	0.991743	0.991967	0.985804
Montenegro (Roma Settlements)									
Accuracy	0.996835	0.981013	0.889241	0.908228	0.974684	0.889241	0.981013	0.981013	0.996835
Precision	1	0.871795	0.5	0.75	1	0.5	0.871795	0.871795	1
Recall	0.971429	0.971429	0.171429	0.257143	0.771429	0.257143	0.971429	0.971429	0.971429
F1-Score	0.985507	0.918919	0.255319	0.382979	0.870968	0.339623	0.918919	0.918919	0.985507
ROC AUC	0.999288	0.976817	0.877885	0.879309	0.99878	0.953533	0.998983	0.998983	0.999492

Table 4 presents the comparative predictive performance of a broad set of machine-learning algorithms estimated for each country context. Overall, ensemble-based models, particularly Random Forest and Extra Trees, demonstrate the strongest and most consistent predictive performance across the three study settings. These models achieve very high levels of accuracy and ROC AUC, suggesting that they are well suited to capturing the complex socio-economic and resource-related patterns associated with multidimensional poverty in Roma settlements (Alkire & Foster, 2011; Cheng, 2019; Hassan, 2024).

The machine-learning results complement the logistic regression findings by showing that multidimensional poverty is shaped by multiple interacting predictors rather than by isolated socio-economic factors alone. In this regard, ensemble models are especially useful because they can capture non-linear relationships and interaction effects that may not be fully reflected in the logistic specification (Cheng, 2019; Kambuya, 2020). At the same time, the comparative model results indicate that performance patterns are not identical across countries, which points to meaningful contextual variation in poverty-related risks and supports the need for country-sensitive poverty analysis within the WEF Nexus framework (Ozden & Guleryuz, 2022; UNECE, 2022).

Beyond predictive performance, the machine-learning analysis also provides insight into which socio-economic and WEF-related variables contribute most strongly to multidimensional poverty classification. Figure 1 therefore summarizes the most influential predictors across Serbia, North Macedonia, and Montenegro and helps clarify how the relative prominence of these variables differs across country contexts. Figure 1. Feature importance across machine-learning models for multidimensional poverty prediction in Roma settlements in Serbia, North Macedonia, and Montenegro. The figure presents the relative contribution of the most influential socio-economic and WEF-related predictors across the classification models. Higher

values indicate greater contribution of a given predictor to model-based poverty classification within each country setting.

Figure 1 provides a clearer interpretation of the machine-learning results by showing which socio-economic and WEFE-related variables contribute most strongly to poverty prediction across the three country settings. In Montenegro, internet access emerges as the most influential predictor, indicating that digital exclusion is closely associated with multidimensional poverty in Roma settlements. This finding reinforces earlier evidence that digital connectivity is increasingly tied to access to information, services, and livelihood opportunities in marginalized communities (Sarma & Pais, 2011; World Bank Group, 2016; Yakubi et al., 2022). Water- and sanitation-related variables also remain prominent, suggesting that deficits in basic service access continue to shape deprivation in important ways, consistent with the WEFE Nexus emphasis on



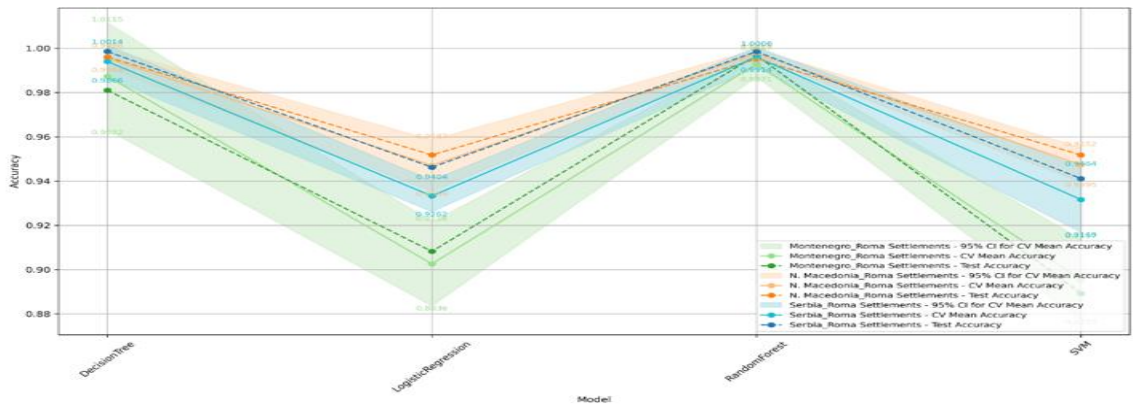
resource-linked poverty pathways and with SDG 6 priorities (Wang, 2017; Cheng, 2019; UNECE, 2022).

In North Macedonia, the number of rooms in the household and the ratio of dependents appear among the most important predictors, highlighting the role of household composition, overcrowding, and housing conditions in explaining poverty vulnerability. These patterns are consistent with the broader literature showing that constrained living space and higher dependency burdens intensify multidimensional deprivation in marginalized communities (Huang, 2017). Internet access and sanitation facility emptied also retain considerable importance, suggesting that material infrastructure and social connectivity jointly influence multidimensional deprivation in this setting (El-Meligi et al., 2024).

In Serbia, the most influential predictors include the number of rooms in the household, sanitation facility emptied, has bank account, and male household head. These findings suggest that poverty in Roma settlements is shaped not only by deficiencies in basic living conditions, but also by broader socio-economic vulnerability and unequal access to financial resources. This is consistent with earlier work showing that household structure, gendered vulnerability, and financial access are important dimensions of poverty resilience and economic stability (Demirgüç-Kunt & Klapper, 2012; Ravallion, 2015; Robayo-Abril & Millan, 2019; Jasini, 2024).

Taken together, the feature-importance results show that multidimensional poverty across the Western Balkan Roma settlements is driven by a combination of shared structural disadvantages and country-specific patterns of deprivation. This strengthens the interpretive value of the machine-learning analysis and supports the broader WEFE Nexus perspective that resource inequalities, housing constraints, and socio-economic exclusion are mutually reinforcing dimensions of poverty (Cheng, 2019; UNECE, 2022; El-Meligi et al., 2024).

Figure 2



Model performance with test and cross-validation mean accuracies including confidence intervals across Serbia, North Macedonia, and Montenegro. Random Forest and Extra Trees display the highest and most stable predictive performance across the three country settings. Their relatively tight confidence intervals indicate not only strong classification accuracy but also greater model stability. By contrast, simpler models such as SVM and Logistic Regression show comparatively lower performance and greater variability in some settings, especially in Serbia and North Macedonia. These findings further support the usefulness of ensemble models for capturing complex poverty-related patterns in underserved communities and for strengthening multidimensional poverty analysis in contexts characterized by non-linear socio-economic interactions (Ozden & Guleryuz, 2022; Usmanova et al., 2022; El-Meligi et al., 2024).

Logistic Regression and Machine Learning for Poverty Prediction within the WEF E Nexus

This paper integrates logistic regression and machine-learning models to examine how socio-economic and resource-based factors are associated with multidimensional poverty across Roma settlements in Serbia, North Macedonia, and Montenegro. Within this framework, the WEF E Nexus is used to interpret the role of interconnected household resource conditions, particularly electric lighting access, sanitation facility emptied, improved water access, reliable water supply, and cooking fuel deprivation, in shaping multidimensional poverty outcomes (Zisopoulou & Panagoulia, 2021). These dimensions are closely connected to SDG 1, SDG 6, SDG 7, and broader goals related to social sustainability.

In this design, the WEF E Nexus serves as the conceptual lens for selecting the relevant resource-related predictors, the MPI provides the poverty classification outcome, and the regression and machine-learning models identify how these dimensions are statistically linked at the household level.

Results from the logistic regression analysis show that several WEF E-related variables are strongly associated with multidimensional poverty. Electric lighting access is negatively associated with poverty across all three countries, indicating that households with electricity-based lighting are less likely to be multidimensionally poor. Improved water access in Montenegro is also negatively associated with poverty, while cooking fuel deprivation is positively associated with multidimensional poverty in Serbia, North Macedonia, and Montenegro. These patterns highlight the importance of household resource conditions in shaping deprivation, while also suggesting that broader contextual factors such as infrastructure quality, settlement form, service access, and country-specific institutional conditions may underline these relationships (Cheng, 2019; Matache & Barbu, 2021).

The machine-learning results complement the logistic findings by showing that ensemble methods such as Random Forest, Extra Trees, and XGBoost are highly effective in capturing the complex socio-economic and resource-related patterns associated with multidimensional poverty. The very high accuracy and ROC AUC values reported across countries indicate the usefulness of these models for poverty classification within the WEF E Nexus framework (Alkire & Foster, 2011). The feature-importance analysis

further strengthens the interpretation by identifying the predictors that contribute most strongly to poverty classification in each country context, thereby supporting more targeted and context-sensitive policy discussion (Ahmadi et al., 2024).

Discussion

Additional insights on model performance and resource priorities are provided through the country-specific analysis. In Serbia, the strongest predictors include number of rooms in the household, sanitation facility emptied, has bank account, and male household head, indicating that both material living conditions and socio-economic vulnerability are important in shaping poverty outcomes. In North Macedonia, the results place greater emphasis on household composition and housing conditions, particularly number of rooms in the household and ratio of dependents, alongside internet access and sanitation-related conditions. In Montenegro, internet access emerges as a particularly important predictor, together with reliable water supply and other service-related conditions. These patterns suggest that although multidimensional poverty in Roma settlements reflects common structural disadvantages, the relative prominence of specific predictors differs across the three country settings (Cheng, 2019).

These cross-country differences are likely shaped by broader contextual factors rather than by a single common poverty mechanism. In Montenegro, the stronger role of internet access may reflect the growing importance of digital connectivity for access to services, information, and opportunities in smaller and more spatially uneven settlement contexts. In Serbia, the greater prominence of sanitation-related conditions and access to formal financial services may point to the continued importance of basic service deficits alongside economic exclusion in larger and more internally differentiated Roma communities. In North Macedonia, the stronger role of household composition and housing-related constraints suggests that overcrowding, dependency burden, and family-level resource pressures remain especially important in shaping poverty vulnerability. These contrasts indicate that multidimensional poverty is influenced not only by shared deprivation, but also by differences in policy environments, infrastructure provision, historical marginalization, and local socio-economic conditions across the three countries (Rochovská & Rusnáková, 2018; Orton et al., 2019; World Bank, 2019).

The findings of the study emphasize the need for targeted policies that respond to differences in the socio-economic and resource-based challenges faced by Roma settlements across the Western Balkans. At the local-government level, the results suggest that interventions should prioritize household service deficits that are most strongly associated with multidimensional poverty in each country's context. In areas where electric lighting access and cooking fuel deprivation are especially important, municipal and national actors should expand access to cleaner household energy through subsidized electricity connections, safer cooking technologies, and settlement-level upgrading of basic infrastructure. In locations where improved water access, reliable water supply, and sanitation-related conditions remain prominent, local governments and service providers should prioritize piped service extension, regularized sanitation maintenance, and community-level investment in safe waste and wastewater systems (Bhabha et al., 2017; World Bank, 2019).

The findings also point to a practical role for NGOs and community-based organizations. Where internet access and having a bank account emerge as strong predictors, NGOs can support digital inclusion through community access points, digital literacy initiatives, and assistance with access to online public services, while also facilitating financial inclusion through documentation support, account-opening assistance, and outreach to underserved households. In addition, because housing-related variables such as number of rooms and household crowding remain important across settings, poverty-reduction strategies should include housing improvement, overcrowding reduction, and dwelling regularization measures as part of a broader multidimensional intervention framework (Alkire & Foster, 2011; Matache & Barbu, 2021; Lekobane et al., 2024; Ahmadi et al., 2024).

More broadly, the machine-learning results can help policymakers and NGOs prioritize interventions according to the strongest poverty-related predictors in each country setting rather than applying a uniform

strategy across all Roma settlements. In this sense, the study supports a more operational use of poverty analytics: Serbia may require stronger emphasis on sanitation-related deficits and financial exclusion, North Macedonia on housing pressure and household dependency burden, and Montenegro on internet connectivity and service-related access conditions. Such a targeted approach would improve the practical value of resource allocation by aligning interventions more closely with the country-specific deprivation structures identified in the analysis.

Conclusion

The consistent identification of key WEF-related and socio-economic factors across Roma settlements in Serbia, North Macedonia, and Montenegro indicates the need for an integrated approach to multidimensional poverty reduction. The findings suggest that household resource conditions, housing quality, service access, and socio-economic inclusion are closely linked to poverty outcomes in these communities. In this respect, the study supports the broader WEF Nexus perspective by showing that multidimensional poverty is shaped by interconnected forms of deprivation rather than by isolated deficits alone.

By combining logistic regression with machine-learning analysis, the study provides a useful framework for identifying both shared and country-specific predictors of multidimensional poverty in Roma settlements. These results offer a stronger basis for SDG-aligned policy thinking in the Western Balkans, especially in relation to resource access, infrastructure improvement, housing conditions, and financial and digital inclusion. Rather than treating poverty as a single-dimensional problem, the study highlights the value of integrated and context-sensitive approaches to social sustainability and poverty reduction in marginalized communities, while also underscoring that effective interventions must be responsive to differences in regional policy environments, infrastructure conditions, and historical patterns of exclusion across the three countries.

The findings also suggest that local governments and NGOs can use country-specific predictor patterns identified through the machine-learning analysis to guide more practical and targeted interventions in energy, sanitation, housing, financial inclusion, and digital access.

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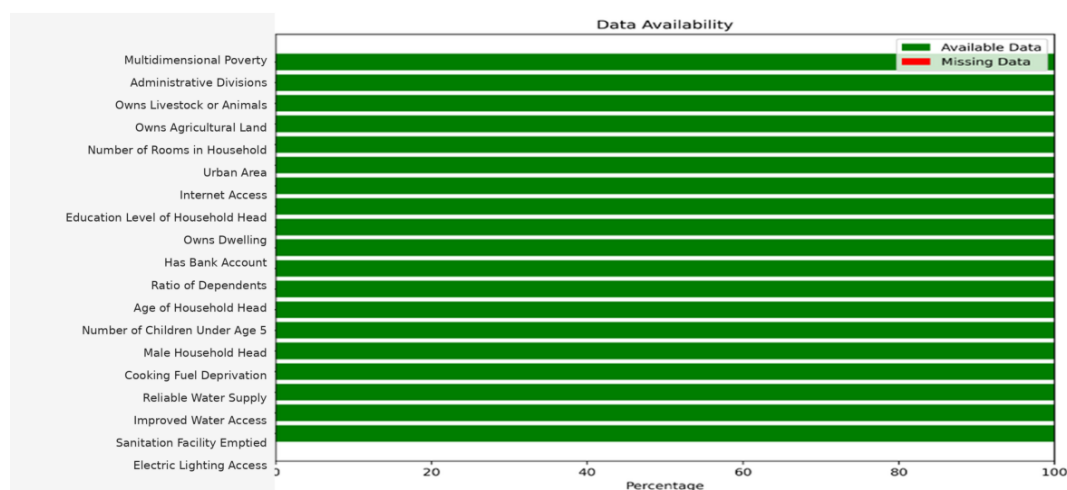
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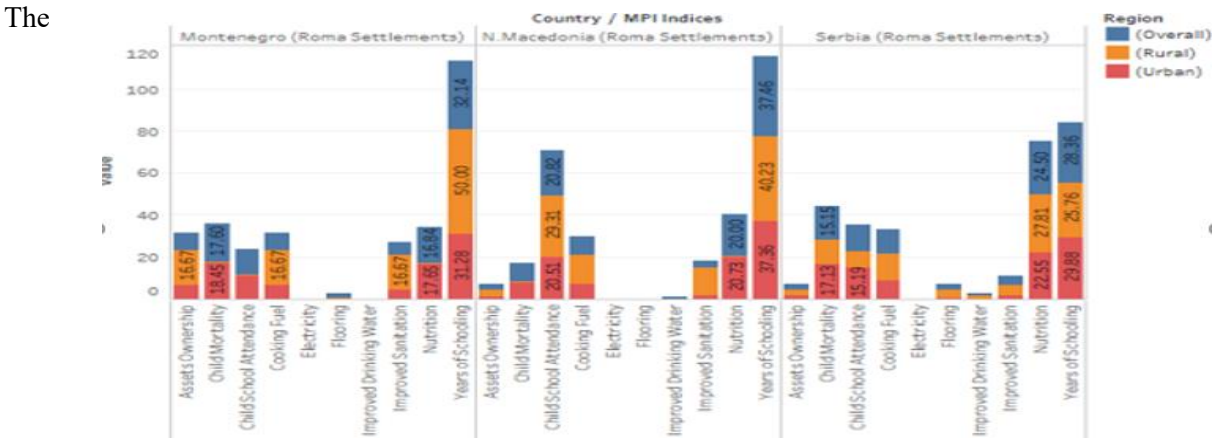
Appendix

Appendix Figure 1. Data Availability



Appendix Figure 1 illustrates the availability of data for the selected socio-economic and resource-related variables under study, where complete data (100% availability) exists for each indicator. The high level of data availability makes it possible to undertake multidimensional poverty analysis and resource access, which in turn supports the development of robust insights into the contribution to poverty dynamics of these domains (water supply, sanitation, energy) within the WEFE Nexus framework.

Figure 2
Percentage Contribution of indicators to MPI across Roma Settlements in Serbia, North Macedonia, and Montenegro



Appendix Figure 2. Shows how different indicators contribute differently to the Multidimensional Poverty Index (MPI) at Roma settlements in Serbia, North Macedonia, and Montenegro by indicating the overall, rural and urban regions.

Child school attendance, years of schooling, and access to improved sanitation all play important roles in MPI values in all three countries, consistent with the point that education and access to sanitation play a crucial role in multidimensional poverty (Alkire and Foster, 2011). The almost 50 percent contribution of school attendance in rural Montenegro clearly shows educational deprivation. A similar trend is observed in North Macedonia as school attendance and years of schooling contribute similarly, but especially in rural areas, providing evidence of the role of education in poverty reduction (UNECE, 2022). The results highlight the emphasis on targeted interventions in education and sanitation within Roma settlements to diminish poverty across the regions (Ferrer, & Garcia, 2023).

Appendix Figure 3. ROC Figures from both traditional and machine learning models

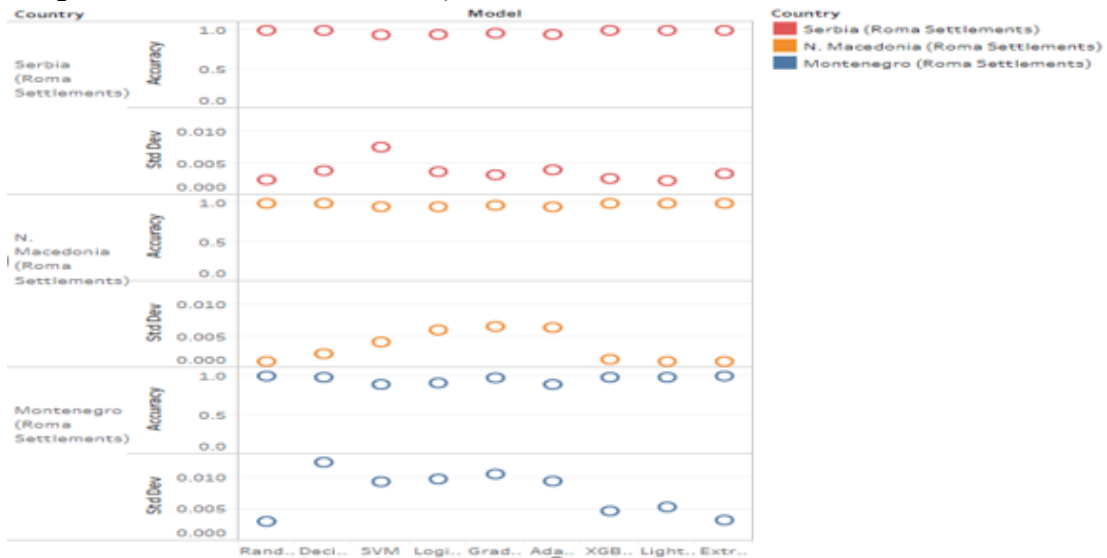
Comparative analysis of AUC ROC curves shows pronounced differences in the accuracy of model prediction of multidimensional poverty between logistic regression and machine learning models in Roma settlements in Serbia, North Macedonia, and Montenegro. The AUC ROC curves for the logistic regression were strong (0.93) in Serbia classifying between poverty and non-poverty cases. Although in machine learning these models have near-perfect predictive accuracy with an AUC of around 1.0, this is indicative of their robustness to learning complex, non-linear socio-economic relationships. Logistic regression reaches an AUC of about 0.88 for Montenegro, a moderate value if logistic regression oversimplifies poverty determinants too much, while machine learning models like Gradient Boosting, Random Forest, and Light GBM achieve near-perfect AUCs. Across the three countries, overall, machine learning models show consistently stronger AUC scores than logistic regression, indicating that they can better identify poverty determinants according to the WEF Nexus framework. This performance advantage suggests that machine learning can be used to inform directed, resources-based poverty alleviation strategies that are aligned with social sustainability and SDG goals.

Tanble 1. Descriptive Statistics for Roma Settlements in Serbia, North Macedonia, and Montenegro

Variables	Obs.	Serbia (Roma Settlements)				Obs.	N. Macedonia (Roma Settlements)				Obs.	Montenegro (Roma Settlements)			
		Mean	S D	Min	Max		Mean	S D	Min	Max		Mean	S D	Min	Max
Reliable Lighting	6876	.98	.13	0	1	5078	.98	.11	0	1	1579	.96	.17	0	1
Sanitation Maintenance	6876	.3	.45	0	1	5078	.01	.12	0	1	1579	.06	.24	0	1
Safe Water Access	6876	.98	.13	0	1	5078	.99	.03	0	1	1579	.98	.11	0	1
Consistent Water Supply	6876	.70	.45	0	1	5078	.70	.45	0	1	1579	.90	.29	0	1
Energy for Cooking	6876	.56	.49	0	1	5078	.36	.48	0	1	1579	.50	.5	0	1
Gender of Household Head	6876	.83	.37	0	1	5078	.83	.36	0	1	1579	.86	.33	0	1
Number of Children Under <u>Age 5</u>	6876	.89	.97	0	4	5078	.72	.91	0	5	1579	1.28	1.21	0	6
Age of Household Head	6876	46.27	13.11	17	95	5078	46.35	12.6	18	82	1579	40.43	12.23	15	95
Ratio of Dependents	6876	84.98	84.18	0	800	5078	73.66	65.60	0	500	1579	131.95	110.45	0	700
Financial Inclusion	6876	.62	.48	0	1	5078	.87	.33	0	1	1579	.46	.49	0	1
Ownership Status of Household	6876	.89	.31	0	1	5078	.88	.31	0	1	1579	.63	.48	0	1
Education Level of HH Head	6876	.20	.40	0	1	5078	.19	.39	0	1	1579	.71	.57	0	2
Digital Access	6876	.75	.43	0	1	5078	.79	.40	0	1	1579	.51	.5	0	1
Area	6876	.67	.46	0	1	5078	.93	.24	0	1	1579	.80	.39	0	1
Number of Rooms in Household	6876	2.25	.97	1	8	5078	2.11	.89	1	7	1579	2.12	1.17	1	8
Ownership of Agricultural Land	6876	.03	.17	0	1	5078	.01	.11	0	1	1579	.01	.13	0	1
Ownership of Livestock or Animals	6876	.10	.30	0	1	5078	.03	.18	0	1	1579	.03	.17	0	1
Region	6876	1.99	1.20	0	3	5078	5.06	2.26	0	7	1579	1.00	.46	0	2

Appendix Figure 4. Cross-Validation Accuracy with Standard Deviation across Serbia, North Macedonia, and Montenegro

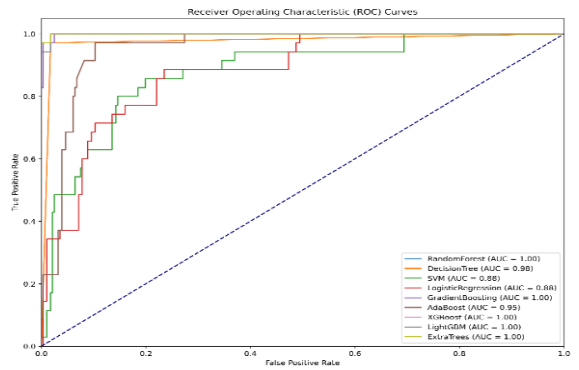
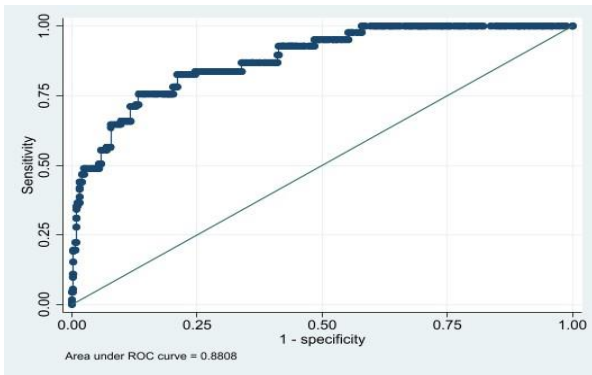
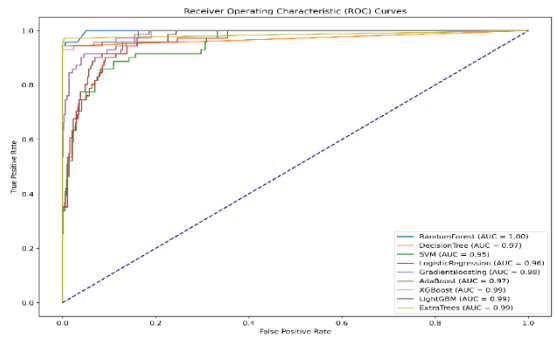
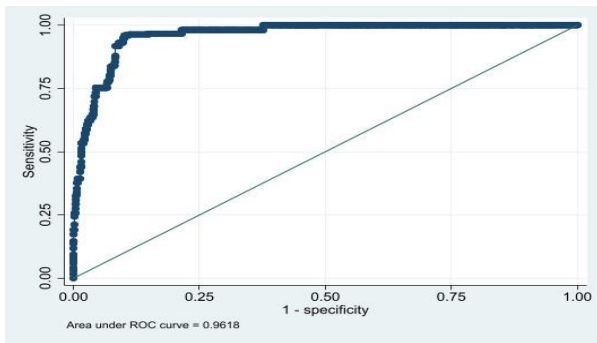
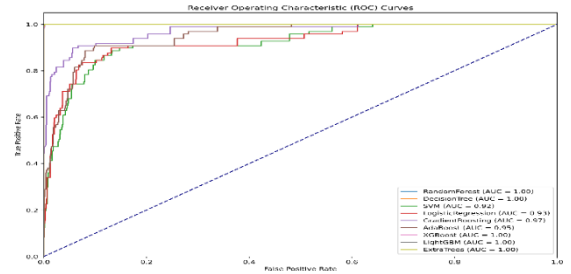
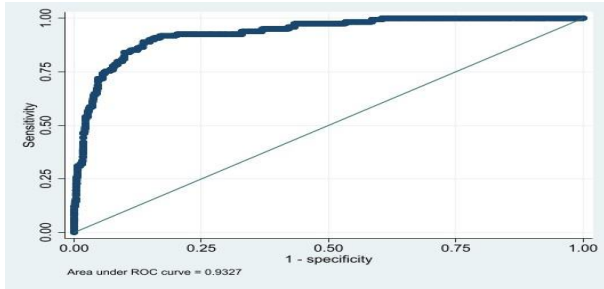
Appendix 4. Figure shows cross-validation accuracy and standard deviation for machine learning models applied to Roma settlements in Serbia, North Macedonia, and Montenegro. Random Forest, Extra Trees, and Light GBM are all machine learning ensemble models, and they demonstrate consistently high accuracy, and standard deviations that are almost zero, in all three countries, indicating a steady and reliable approach to poverty prediction. Some of their effectiveness in handling complex, multi-dimensional poverty data, is consistent with prior findings that such models feature intricate socio-economic relationships (Ferrer, & García, 2023). By contrast, SVC and Logistic Regression have lower accuracy and higher standard deviations, especially in Serbia and North Macedonia, and thus comparatively may be less capable of modeling the non-linear relations typically encountered in poverty-related data. The low variability and high accuracy of these models make them suitable for targeting resource-based poverty alleviation strategies in the WEFE Nexus context to address some key SDGs by identifying the resources along the WEFE Nexus (El-Meligi et al., 2024, Rogner, Bauer, 2022; UNECE 2022).



Appendix Table 2. Comparative Model Accuracy Analysis with Confidence Intervals across Roma Settlements in Serbia, North Macedonia, and Montenegro

Appendix Table 2. presents the test accuracy, mean accuracy, and the cross-validation (CV) standard deviation for different machine learning models applied to Roma settlements in Serbia, North Macedonia, and Montenegro. On the other hand, Ensemble models do well with Random Forest, XG Boost, and Extra Trees having high test and mean accuracies close to 0.99 and low CV standard deviations across all three countries. This stability is due to this strong predictive power as well as reliability, especially in their ability to pick up the esoteric, multi-dimensional facets of poverty within marginalized communities. Results from these examples demonstrate the utility of ensemble methods in the WEF Nexus, which are useful for identifying critical resources, including water, energy, and sanitation as determinants of poverty. As these models increase the accuracy and consistency of predicting poverty, they are appropriate for SDGs, serving as robust tools to guide targeted poverty alleviation interventions (El-Meligi., et al., 2024, Rogner, & Bauer, 2022; UNECE, 2022).

Appendix Figure 3.

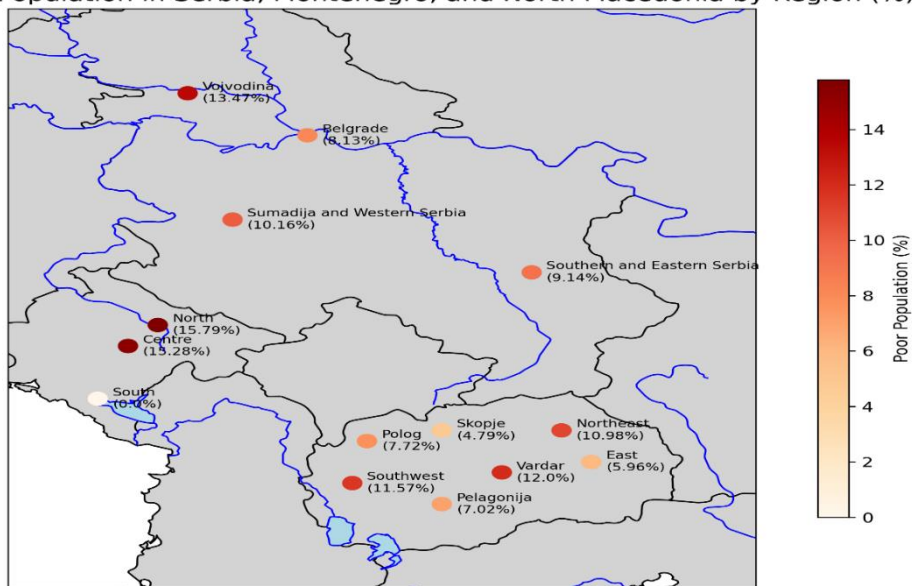


Appendix Table 2.

Model	Serbia (Roma Settlements)			N. Macedonia (Roma Settlements)			Montenegro (Roma Settlements)		
	Test Accuracy	Mean Accuracy	CV Std Dev	Test Accuracy	Mean Accuracy	CV Std Dev	Test Accuracy	Mean Accuracy	CV Std Dev
Random Forest	0.998547	0.996	0.002343	0.995079	0.997784	0.000922	0.996835	0.992879	0.002951
Decision Tree	0.998547	0.994	0.003796	0.996063	0.995568	0.002148	0.981013	0.987349	0.012346
SVM	0.941134	0.931636	0.007527	0.951772	0.947316	0.004012	0.889241	0.895483	0.009275
Logistic Regression	0.946221	0.933273	0.003618	0.951772	0.94707	0.005932	0.908228	0.902601	0.00969
Gradient Boosting	0.962209	0.963818	0.003118	0.969488	0.974399	0.006476	0.974684	0.97071	0.010474
Ada Boost	0.946948	0.938	0.003916	0.950787	0.950516	0.006307	0.889241	0.907353	0.009352
XG Boost	0.998547	0.995091	0.002545	0.995079	0.9968	0.001256	0.981013	0.991292	0.004613
Light GBM	0.998547	0.994182	0.002197	0.995079	0.996553	0.000922	0.981013	0.992882	0.005242
Extra Trees	0.998547	0.994545	0.003303	0.996063	0.997784	0.000922	0.996835	0.990501	0.003164

Appendix Figure 5

Roma Poor Population in Serbia, Montenegro, and North Macedonia by Region (%)



Exploring Collocation and Semantic Prosody of English and Urdu Translation Equivalents in Cross-linguistic newspapers

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The present study aims to explore collocational behavior and semantic prosody of English content words and their Urdu translation equivalents using two newspapers from different languages. The English corpus was built based on the editorials from *The Sun* which is one of the most widely circulated English newspaper in UK and the Urdu corpus was extracted from the editorials in *Daily Jung* which is one of the most widely circulated Urdu newspaper in Pakistan. The analysis of semantic prosody was carried out using the latest version of #LancsBox. The identification and categorization of the semantic prosody are based on Stubbs (1995) classification of semantic prosody. The findings of the study indicate that semantic prosody and semantic environment of English lexical items and their Urdu first translation equivalents significantly vary. This led to the interpretation that the first translation equivalents identified in the widely used bilingual English to Urdu dictionaries are not equivalents as they convey entirely different semantic prosody. The findings of the study also highlighted the incorrect and inconsistent treatment of semantic prosody in the Monolingual Urdu and English dictionaries. Moreover, the present study emphasizes the pedagogical implications and presents recommendations intended to direct future research in this area.

Keywords: semantic association, semantic prosody, collocational behavior, corpus linguistics, Urdu corpus

Over the last three decades, corpus-based research has discovered evidence that words do not have fixed meanings in themselves. Instead, the meaning of a word is determined by how it is used with other words in contexts (Hanks, 2013; Thuratham & Namsaeng, 2025). This type of meaning which is formed through the co-text is referred to as semantic prosody (Louw, 1993; Partington, 2014). Semantic prosody in cross-linguistic studies reveals significant insight into how corpus-based contrastive studies enhance translation precision and understanding of cultural differences that affect the variation of collocational behavior and semantic associations. Studying semantic prosody in classroom settings, Stewart (2009) highlighted the issue of semantic prosody by stating that semantic prosody is “a reality that translators are required to address, otherwise important source text elements will be left unaccounted for” (p.29). It is observed that translation equivalents differ in collocational behavior and semantic prosody. The bilingual dictionaries show inconsistency with the treatment of semantic prosody especially in English-Urdu dictionaries. These observations underscore the need for a systematic cross-linguistic analysis of semantic prosody. Though, several studies in the literature explored the semantic prosody in parrell and comparable corpora to examine semantic prosody of translation equivalents and the inadequacy of semantic prosody in the dictionaries, the vast majority of these studies focus on English; there are a few studies that explored semantic prosody cross-linguistically. However, semantic prosody of English and Urdu translation equivalent has received less attention. To fill this gap, the present study seeks to explore collocations and semantic prosody

in English and Urdu newspapers and use two monolingual English and Urdu dictionaries as reference corpora to examine the inadequacy of the semantic prosody of the lexical items in the dictionaries. Moreover, it is important to note that the previous researchers believe that semantic prosody of a word may vary across genres. Therefore, in order to avoid this subtleness, the researcher has only incorporated the editorials as target corpora in both languages to compare the semantic prosody of English lexical words and their Urdu translation equivalents used in the same genre. The issue of non-equivalence in translation has been empirically demonstrated in corpus-based studies showing that English lexical items and their Urdu translation equivalents often diverge in semantic prosody and usage patterns (Ullah et al., 2023), highlighting limitations in bilingual lexicographic representation.

Literature Review

The concept of semantic prosody (SP) was first introduced to the public by Bill Louw in 1993 which he credited to Sinclair (1991). Louw defines semantic prosody as “a consistent aura of meaning with which a form is imbued by its collocates (Louw, 1993, p. 57). In 1996, Stubbs expanded the concept of semantic prosody and argued that words can have collocational relationships not only with exclusively positive or negative semantic prosody but also with broader semantic sets. To support his point, Stubbs conducted a thorough analysis of various words using two different corpora. He categorized their collocates into positive, negative, or specific lexical sets. For example, he discovered a nuanced prosodic pattern in the word “job” which exhibited both positive and negative collocations. In contrast, “career” predominantly demonstrated positive associations.

Gabrovšek (2007) laments that the treatment of semantic prosody in dictionaries is often inconsistent or inadequate. Resultantly, ESL/EFL learners frequently choose inappropriate word choices because they rely upon the dictionaries (Alzaharani, 2021; Nezhad, 2021). Similarly, Sardinha (2000) explored the inadequacies of contemporary dictionaries through a corpus-based study. The researcher concludes that semantic prosody should be part of glossaries and dictionaries. Especially, this phenomenon should be part of bilingual dictionaries because the translators always rely on them. Thus, semantic prosodic description can be an important part of lexicography (Šorli, 2013). Ji and Wu (2000) investigated the semantic prosody of three content words *set in*, *rife*, and *propaganda* in three contemporary bilingual English-Chinese dictionaries. The semantic prosody of these lexical items were previously examined by Sinclair (1991) and he had established that these lexical items often carry negative semantic prosodies. However, the findings of the study of Ji and Wu (2000) show that none of the bilingual dictionaries they examined accurately reflected the negative semantic prosody of the phrase *set in*. Additionally, the dictionaries even provided incorrect information about the semantic prosodies of *rife* and *propaganda*, potentially misleading their users. Safeer et al., (2024) examine gender-based variation in paired monophthongs in Pakistani English, offering sociophonetic insights that support broader analyses of linguistic variation relevant to cross-linguistic studies of English and Urdu newspaper discourse.

Hunston (2007) emphasizes that in the context of translation, the translators and the translation studies scholars should understand the evaluative meaning or more specifically attitudinal meaning associated with words and text. Several linguists have investigated the attitudinal meaning or semantic prosody of translation equivalents in cross-linguistic corpus. Partington (1998) investigated the Italian word ‘impressionante’ and its English translation equivalent ‘impressive’ in English. The finding of his study show that the English translation equivalent *impressive* frequently co-occur with positive collocate like ‘talent’, ‘achievement’, and ‘dignity’ which contribute to the positive semantic prosody of the node. However, the Italian translation equivalent ‘impressionante’ often appear in negative and neutral semantic environment like ‘series of price rises’ and ‘assassination attempts’ which exhibit unfavorable associated meaning. The finding of the study thus confirms that translation equivalents can form opposite meaning, therefore, when translating a text into another such features of word meaning should be incorporated. Similarly, Sardinha (2000) conducted a corpus-based contrastive analysis of various Portuguese lexical items and their English translation equivalent to explore semantic prosody of these translation equivalents focusing on their translatability and

inadequacies in the bilingual dictionaries. Utilizing a large corpus of 140 million words in Portuguese and 100 million words English corpus, the study reveals that semantic prosody of translation equivalent words vary across languages and this phenomenon cannot easily be identified through intuition. Moreover, this study emphasizes the need for translators to access corpus-based information on semantic prosody to ensure accuracy in the attitudinal meaning. McEnery and Xiao (2010) also investigated the verb 'cause' and its Chinese translation equivalent. The finding of his study strongly corroborates with the finding of the study of Sardinha (2000). The researchers have also investigated several other words in English and their Chinese translation equivalents and based on the findings of their study they contend that semantic prosody and semantic preferences are potentially be observed in English. They highlight that the English near synonymous words and their Chinese equivalents exhibit similar semantic prosody and collocational behavior. Dam-Jensen and Zethsen (2007) explored the Danish verbs 'medføre' and 'forårsage' and their English translation equivalents *lead to* and *cause*. The findings of their study show that the Danish verbs 'forårsage'/'medføre' and their English translation equivalents *lead to* and *cause* show similar semantic prosody and semantic preferences. However, Dam-Jensen and Zethsen (2007) argue that in different languages semantic prosody and semantic preferences of lexical words and their equivalent in other languages may demonstrate different semantic prosody and collocational behavior. This argument was supported by the study of Wu and Li (2016) that through a corpus based study they explored the differences and similarities in semantic prosody of the Chinese adverb *shaowei* and its English translation equivalent *a little*. The node words were processed in a Chinese corpus built by the Center for Chinese Linguists which is consist of 477 million word and the Brown Corpus. The finding of the study show that the Chinese adverb *shaowei* appears in neutral semantic environment which contribute to the neutral semantic prosody of *shaowei*. Contrarily, the English adverb *little* tends to co-occur with negative collocations demonstrating negative semantic prosody of *a little*. Based on the finding of the study the researchers suggest the lexicographers to compile dictionaries in which words are defined based on the evaluative meaning or semantic prosody.

In the Pakistani context, Khatoon et al., (2021) investigated semantic prosody in corpora of American and Pakistani English songs using the corpus tool LancsBox. The findings of their study show that the semantic prosody of a word is influenced by other words in the environment or context. For example, the node word 'love' has positive semantic prosody, but when combined with the collocate 'bleeding,' its semantic prosody becomes negative. It demonstrates how words impact each other's meaning and semantic prosody when they co-occur. Further findings of the study showed that in the corpus of Pakistani songs, the word love was found in a negative environment however, in the corpus of American songs love was found to have a positive semantic prosody.

After reviewing the existing literature on the topic, it can be concluded that the previous studies have investigated the semantic prosody of English words as well as in other languages, however, little attention has been given to the semantic prosody of English and Urdu translation equivalents. Therefore, the current study aims to investigate the semantic prosody of the target words in English and their Urdu translation equivalents using English and Urdu editorials and two bilingual dictionaries as reference corpora.

Method

The present study utilizes a corpus-based methodological framework, drawing upon two cross-linguistically comparable, tailor-made corpora of English and Urdu, to explore the collocational behavior and semantic prosody of selected English lexical items and their corresponding Urdu translation equivalents. In terms of building the corpus, the researcher selected two newspapers based on their top ranking of yearly circulation and popularity. The English corpus is based on *The Sun* which is one of the most read English newspaper in the United Kingdom (Leone, 2023) and is based on *Daily Jung* which is one of the most read Urdu newspaper in Pakistan (Pahore et al., 2021). However, the genre was delimited to only editorials for both newspapers in order to explore semantic prosody of English lexical items and their Urdu translation equivalent across same genre. The second reason for choosing editorials was that as compared to opinion articles, headline news and magazines, editorials presents a more balanced view while incorporating both

factual information and opinions. This approach provides a deep understanding of semantic prosody in a language which is shaped by both subjective and objective elements.

Table 1
Overview of the Corpora

Name	Language	Time span	Files	Corpus size
Daily Jung	Urdu	2020-2023	165	100510
The sun	English	2020-2023	165	101397

The Target Words

The target words were selected based on two criteria. Firstly, the target words should have high-frequency occurrences in both corpora because high-frequency occurrences of the target words would be representative data. This helps ensure the relevancy and applicability of the results to a broader range of linguistic situations. Secondly, the target words should not be homonyms. The aim of investigating semantic prosody is to explore the underlying positive, negative, and neutral connotations linked with a specific word in a given context and if the target word is a homonym, it will certainly carry different semantic prosody, leading to confusion in the analysis. Therefore, to avoid ambiguity and ensure clarity in the interpretation of the results, homonymous words were excluded. Based on the above given criteria, the target words for the analysis were selected after going through following several steps. First of all, the researchers generated wordlists of both corpora in #Lancsbox and identified 50 high-frequency lexical items in both corpora. In the second step, the researchers manually identified all the frequently occurring English lexical words from the wordlist that have translation equivalents in the Urdu corpus wordlist. Thus, the researchers found 12 English content words that had translation equivalents in Urdu corpus wordlist. However, to choose the target words through a proper process, in the third step, the translation equivalents were also compared with definitions in two widely used bilingual (English-to-Urdu) dictionaries for the reliability and validity of the selection of translation equivalents. After searching the translation equivalents in both bilingual dictionaries, only the content words that had same first translation equivalent in both dictionaries were selected as it represents the primary meaning, which is more likely to show consistent prosodic patterns across languages and ensures greater reliability and comparability in the analysis. Thus, the researchers selected the following English lexical words (Table 2) which have same Urdu translation equivalents in both bilingual dictionaries and they have close frequency in both corpora.

Table 2
Selected target words

S.No	English Lexical Words	Frequency in The Sun	Urdu Translation Equivalents	Frequency in Daily Jung
1	Time	165	وقت /vəqt/	172
2	decision	44	فیصلہ /fɛsla:/	81
3	world	90	دنیا /dɒn.ja:/	89
4	public	47	عوام /əvɑ:m/	106

Corpus analysis tool

The corpus analysis tool #LancsBox 6.0 (Brezina et al., 2015) was primarily utilized for the investigation of collocation and semantic prosody of English lexical items and their Urdu translation equivalents. However, as #LancsBox does not fully support Urdu corpora in several cases as the concordance lines of Urdu text have to be read from left to right in Lancsbox though Urdu is a right-to-left language. In order to compensate the limitation the researchers used Antconc corpus tool for the extraction of KWIC of Urdu node words, so that the precision of Urdu language be maintained.

Data Analysis Procedure

The identification and analysis of semantic prosody have been carried out based on a combined analytical framework of Louw (2000) and Stubbs, (1995) approaches. Following the Louw's analysis approach, the target words were analyzed through concordance lines within the span of 5 words to the both left and the right of the node. Reading concordance lines of the nodes, the researchers identified the collocates of the node whether the collocates are positive, negative, or neutral in the context. However, following Stubbs' approach, the node words were analyzed looking at the collocates that have strong association with them. For this purpose, unlike Stubbs, the researchers utilized Graph Coll tool under #LancsBox to extract first order collocation network which is suitable and more advanced tool for the statistical measures of the collocates. The three strongest associated collocates were then analyzed separately through the second order collocates to look at the general associated meaning of the node words in the corpus. The parameter for using Graphcoll given by Brezina et al., (2015) was modified based on the objectives of the study to improve the reliability of the analysis. The collocates for the node words were extracted from a span of four words to the left and four words to the right of the node. However, the parameter has been modified when the graph is jumbled up for a clearer collocation network. The statistical measurement tool MI-score with the statistic value 3 was chosen for the extraction of the collocation network. The MI score is used to determine the strength of the association between two items. A higher MI score indicates a stronger link between the items, while a score closer to 0 suggests that the two items are more likely to co-occur by chance. Therefore, the MI score is effective in identifying such collocation pairs. Moreover, the functional words have been removed to extract clearer graphs of the nodes. (see Table 2)

Table 3

GraphColl Parameters

Notation Categories	Statistic ID	Statistic Name	Statistic cut-off value	L and R Span	Minimum collocate freq. (C)	Minimum collocation freq. (NC)	Filter
Example	3a	MI	3	L4 R4	3	3	Function words Removed

Note: Adapted from Brezina et al. (2015)

After analyzing the collocates of node words through graphs and concordance lines, the results from the two analysis approaches were analyzed together in terms of prosodic strength to classify and categorize the types of semantic prosody of the node words. After that, the results were categorized based on Stubbs (1995) classification of semantic prosody. According to Stubbs (1995), if a word attracts collocates primarily by strong negative semantic characteristics, it has a negative semantic prosody. If the collocates are mostly positive, the word has a positive semantic prosody. When both positive and negative collocates are present in the context, the word is said to have neutral or mixed semantic prosody. Moreover, the definitions of the node words were also checked against two widely used monolingual dictionaries in Urdu and English as reference corpus to check the denotative meaning and the kind of semantic prosody of the nodes reflected in the monolingual dictionaries.

Results and Discussion

Time وقت /væqt/

The word *time* is an abstract noun which exhibits a neutral semantic prosody in the OLD. The word وقت /væqt/ found to be the first Urdu denotative translation equivalent of *time* in the bilingual dictionaries. The word وقت /væqt/ in the UL also conveys a neutral semantic prosody. However, based on the findings of the study, the word *time* and its Urdu translation equivalent وقت /væqt/ show different collocational behavior and semantic prosody. *Time* conveys a strongly positive semantic prosody in the English corpus while وقت /væqt/ appeared in both negative and positive semantic environment. Based on the MI score, *time* was primed to co-occur with the collocates *likespend*, *right* and *test* in the English corpus. When *time* is collocated with the word *spend* it conveys a strong positive associated meaning that reveals a theme of love and care. The

priming of *time* and *right* also appeared in pleasant semantic environments that highlighted the themes of seizing opportunities while waiting and making choices on the suitable time. Similarly, the combination of *time* and *test* which is an unusual priming, found to have explicitly positive connotative meaning which emerges themes like triumph or success. However, the Urdu translation equivalent وقت /vəqt/ had distinctive collocational behavior that it was found to be primed with the collocates like روٹی /ro:ʃi:/, مقرر /muqərrər/, تقاضہ /ʧəqɑ:zɑ/. One of the most interesting findings is that the word وقت /vəqt/ has neutral semantic prosody in the UL while its collocate روٹی /ro:ʃi:/ has positive semantic prosody. However, the combination of وقت /vəqt/ and روٹی /ro:ʃi:/ conveys a strong negative semantic prosody as the collocate اردو وقت کی روٹی is associated with the themes like hardship, inflation and poverty which is further strengthened by other collocates such as مشکلات (difficulties), مسائل (problems), and معاشی (economic). This finding corroborates with the finding of the study of Hu, (2015) that according to him a word's distinctive semantic prosody cannot be correctly determined unless its collocates are thoroughly examined in context which means that semantic prosody extends beyond single words and collocates. However, this finding contradicts Stubbs' (1995) argument that when a word in a sentence attracts collocates that are predominantly associated with negative semantic traits, the word has strong negative semantic prosody. Conversely, if the collocates are mostly positive words, the word is considered to have a positive semantic prosody. However, in this case the collocate روٹی /ro:ʃi:/ has positive semantic prosody but the combination of it with وقت /vəqt/ exhibits intense negative semantic prosody. This discrepancy occurred due to the social context and linguistic influence. The second important and interesting finding is that the combination of *time* with *test* in the English corpus explicitly shows strong positive semantic prosody. Conversely, in the Urdu corpus, the collocate امتحان /imʧhɑ:n/ which is first translation equivalent of *test*, intensifies the negative semantic prosody of the combination of وقت /vəqt/ and روٹی /ro:ʃi:/. The other strongly associated collocates of وقت /vəqt/ in the Urdu corpus are مقرر /muqərrər/ and تقاضہ. The combination of وقت /vəqt/ and مقرر /muqərrər/ imply a favorable semantic prosody. However, it has a unique semantic environment of *politics* that it has been only used in the context of politics. Moreover, the combination of وقت /vəqt/ and تقاضہ /ʧəqɑ:zɑ/ (demand) also found to be appeared in positive semantic environment which highlight a sense of responsibility and urgency. These two combinations وقت /vəqt/ تقاضہ- /ʧəqɑ:zɑ/ and مقرر- وقت /muqərrər/ appeared in unique semantic environment of politics. However, the combination of *time* and the strongly associated collocates found to be used in different semantic environment.

Decision فیصلہ /fəslɑ:/

The English word *decision* in OLD refers to a choice or a judgment which is made while pondering upon a matter. It explicitly exhibits a positive semantic prosody in the OLD as the predominant collocates of *decision* found in the OLD are *right* and *final* which combining with the *decision* convey a strong sense of perseverance and support. On the other hand, فیصلہ /fəslɑ:/ is the Urdu translation equivalent of *decision* which is also found to have strong positive semantic prosody in the UL that refers to an act of resolving or settling a dispute, conflict and lawsuit. The findings of the study show significant differences in the semantic prosody and collocational behavior of فیصلہ /fəslɑ:/ and *decision* not only in the English and Urdu comparable corpora but also exhibit opposite semantic prosody in the monolingual dictionaries. The word *decision* in the English corpus appeared in predominantly negative semantic environment forming a strong native associated meaning. *Decision* was strongly collocated with the word *leave* and *close*. When *decision* collocated with the word *leave* it demonstrated a negative semantic prosody and highlighted a theme of loss. It is worth mentioning that the combination of *decision* and *leave* appeared in a unique semantic environment of profession. On the other hand, when *decision* collocated with the word *close*, it also conveyed a negative semantic prosody highlighting a theme of deprivation. However, the translation equivalent فیصلہ /fəslɑ:/ appeared in both negative and positive semantic environment slightly leaning to negative semantic prosody in the Urdu corpus. The frequent collocates of فیصلہ /fəslɑ:/ in the Daily Jung were معطل /moʔatʧal/ (cancel) and عدالتی /ədqɑ:ləʧi:/ (judicial). The combination of فیصلہ /fəslɑ:/ and معطل /moʔatʧal/ exhibits a strong negative semantic prosody which was associated with the meaning of inconsistency and incompetency. On the other hand, the combination of فیصلہ /fəslɑ:/ and عدالتی /ədqɑ:ləʧi:/ found in both negative and positive semantic environment stating a mixed semantic prosody. Thus, if we compare overall semantic prosody of فیصلہ /fəslɑ:/

and *decision* we can see that the word *decision* has been used explicitly in negative semantic environment which forms a negative associated meaning of *decision*. However, the Urdu translation equivalent فیصلہ /fɛslɑː/ had mixed semantic prosody leading slightly towards negative semantic prosody. Though, both words found to imply negative evaluative meaning, they significantly differ in its collocational behavior. The word *decision* was found in different contexts, most dominantly in the context of profession and job while the word فیصلہ /fɛslɑː/ had a unique semantic environment of judiciary in the Urdu corpus which imply that Pakistani news media prioritizes news and discussion about court or lawsuits. One of the interesting findings here is that in the both widely used monolingual English and Urdu dictionaries, the word *decision* and its translation equivalent فیصلہ /fɛslɑː/ found to have positive semantic prosody; however, the findings of the study show that both *decision* and فیصلہ /fɛslɑː/ exhibit negative semantic prosody. This finding corroborates with the study of Gabrovšek(2007) and Lee (2011) that according to them, the treatment of semantic prosody in dictionaries is often inconsistent and sometimes even (Ji & Wu, 2000) the dictionaries provide incorrect information.

World دنیا /d̪ʊn.jɑː/

The English word ‘world’ in OLD found to have neutral semantic prosody that refers to the earth where all the creatures like human and animals exist and it includes all the countries and the natural existence. On the other hand the word دنیا /d̪ʊn.jɑː/ is the first Urdu translation equivalent of *world*. The word دنیا /d̪ʊn.jɑː/ also exhibits a neutral semantic prosody in the UL that refers to the existing universe or world, the present time or the opposite of hereafter. Although, both ‘world’ and دنیا /d̪ʊn.jɑː/ revealed to have neutral semantic prosody in the respective monolingual dictionaries. Both have significant differences in their semantic environment and collocational behavior. The word *world* appeared with the words such as *woman*, *war* and *sport*. The combination of *world* and *woman* showed a mixed semantic prosody which highlighted the themes such as woman empowerment and gender inequity. When the word *world* combined with *war* it explicitly showed negative semantic prosody that highlighted themes like destruction, loss deprivation. However, in a context the combination of *world* and *war* was used metaphorically that implied sense of intense competition in the sport. Similarly, the combination of *world* and *sport* was used with a pleasant semantic prosody. On the other hand, the Urdu translation equivalent دنیا /d̪ʊn.jɑː/ also found to appear in both positive and negative semantic environment with a slight lean towards positive semantic prosody. The combination of دنیا /d̪ʊn.jɑː/ and برقرار /bərɕərəːr/ exhibited a strong positive semantic prosody that highlighted themes like perseverance and consistency. However, the combination of دنیا /d̪ʊn.jɑː/ with پوری /puːriː/ (entire) and مسلم /mʊslɪm/ (Muslim) appeared in both positive and negative semantic environment forming mixed semantic association. One of the interesting findings is that the word ‘world’ found to have a unique semantic environment in the English corpus that it had predominantly used in sports. On the other hand, the word دنیا /d̪ʊn.jɑː/ was used with a unique semantic prosody of politics. This shows how a news media prioritizes semantic environment. The second important finding here is that both *world* and دنیا /d̪ʊn.jɑː/ exhibit neutral semantic prosody in the monolingual dictionaries. However, the findings of this comparative study showed that in both comparable corpora *world* and دنیا /d̪ʊn.jɑː/ conveyed mixed semantic prosody. Similar to Lee’s (2011) observations, this finding reveals that dictionaries frequently fail to accurately present the semantic prosodies of lexical items.

Public عوام /əvɑːm/

The term *public* in OLD exhibits strongly positive semantic prosody that refers to the ordinary people living in a society or community. The strongly associated collocates of *public* in OLD are *safety* and *health* which reveal that it has unique semantic environment of health and medicine. However, عوام /əvɑːm/ found to be the first Urdu translation equivalent of the English word *public* in bilingual dictionaries which in contrast, exhibits negative semantic prosody in the Urdu monolingual dictionary. In the UL عوام /əvɑːm/ refers to common people, layman, opposite to elites and ignorant. In the UL عوام /əvɑːm/ has a predominantly negative semantic prosody as it defines عوام /əvɑːm/ as a person who is not rich or elite and less educated. This finding is in line with Sardinha (2000) that semantic prosody of translation equivalent words vary across languages. In the comparable corpora, both *public* and عوام /əvɑːm/ found to have mixed semantic prosody. It is also worth mentioning that both *public* and عوام /əvɑːm/ predominantly appeared with a unique semantic

environment of politics in the both comparable corpora. The word *public* was found to have strong association with the collocates *opinion* and *think* in the *Sun* corpus. The combination of *public* and *opinion* appeared in unpleasant semantic environment that implied a sense of domination and use of power and authority to manipulate public narratives. However, when the word *public* combined with the collocate *think* it conveyed a positive associated meaning. On the other hand, the word عوام /əvɑ:m/ frequently occurred with collocates such as چکی/ʧki:/ (Mill), خوشحالی/xuʃha:li:/ (Prosperity) and بوجھ/bo:dʒʰi/ (Burden). When the word عوام /əvɑ:m/ collocated with the word چکی/ʧki:/, it gives a metaphorical interpretation of the suffering and hardship of people who were ground in difficulties. The combination of عوام /əvɑ:m/ and بوجھ/bo:dʒʰi/ appeared in both positive and negative context revealing themes such as hardship and relief. However, the priming of عوام /əvɑ:m/ خوشحالی/xuʃha:li:/ found to have strong positive semantic prosody.

Based on these findings and interpretations, the researchers therefore conclude the discussion that semantic prosody and semantic environment of English lexical items and their Urdu first translation equivalents significantly vary. This led to the interpretation that the first translations equivalents identified in the widely used bilingual English to Urdu dictionaries are not equivalents as they convey entirely different semantic prosody such as the word *decision* in the English corpus found to have strong negative semantic prosody which was primed to co-occur with a unique semantic environment of profession or job. On the other hand the word فیصلہ /fɪsɪlɑ:/ (the first translation equivalent of decision) conveyed mixed semantic prosody in the Urdu corpus which was primed to co-occur with the unique semantic environment of judiciary. It can be interpreted that the semantic environment of a word significantly influenced its semantic prosody. However, the semantic environment of translation equivalents considerably vary in different languages because the associated meaning of words are influenced by its culture and language. Therefore, we cannot blindly rely on the translation equivalents in the bilingual dictionaries without knowing its semantic environment in the target language. This interpretation has been supported by one of the findings of the study that the word *public* was found to have strong positive semantic prosody in the OLD that it was appeared in positive semantic environment; however, its translation equivalent word in Urdu عوام /əvɑ:m/ found to exhibit negative semantic prosody in the UL. When both public and عوام /əvɑ:m/ were examined respectively in the comparable corpora, both of them found to appear in different semantic environment and exhibited different semantic prosody. This not only shows the language and cultural influence on the usage of these words but also highlighted the incorrect and inconsistent treatment of semantic prosody in the dictionaries. However, the semantic prosodic strength of these English lexical words and their Urdu translation equivalents can serve as an indicator to translation equivalence. For example the word *world* and its translation equivalent دنیا /d̪n̪.jɑ:/ both found to have mixed semantic prosody in the comparable corpora and they also found to exhibit neutral semantic prosody in the both monolingual dictionaries respectively. Therefore, the two corresponding words can be interpreted to have higher semantic and pragmatic equivalence and may not be considered complete untranslatability. This finding is in line with Wei, and Li (2014) who claimed that the stronger prosodic alignment generally corresponds to higher semantic and pragmatic equivalence, whereas divergence in prosodies suggests limited equivalence but not complete untranslatability. Moreover, the findings of the study confirm the finding of Hu, (2015) that he holds that a word's distinctive semantic prosody cannot be correctly determined unless its collocates are thoroughly examined in context. All the four English words and their Urdu translation equivalents only exhibited the associated meaning through its semantic environment. Therefore, it is important to note that semantic prosody extends beyond single words and collocates.

Implications of the study

Despite the fact that the phenomenon of semantic prosody has been paid much attention at both monolingual and cross-linguistic level for the last three decades showing that semantic prosody of translation equivalents differ in different languages, no effort was put to explore semantic prosody in Urdu translation equivalent and the treatment of semantic prosody in the Urdu dictionaries. Therefore this comparative study was conducted to explore English and Urdu translation equivalents using comparable corpora. The findings of the study has some linguistic and methodological implications. First of all, the present study is the first to explore semantic prosody in Urdu and English using comparable corpora utilizing cutting-edge corpus tools.

By utilizing comparable corpora and a mixed method research the present research provides a foundation to conduct corpus-based studies in Urdu language. The findings and the methodological approaches employed in this study pave the ways for the future researchers in areas such as translation, sociolinguistics and data driven language learning and teaching. Moreover, this research also gives a guideline to use cutting edge corpus tools for the Urdu linguists and researchers that they can apply this model to build Urdu corpus and study linguistic intricacies using these effective corpus tools.

Secondly, the findings of the study have significant implications for both monolingual and bilingual English to Urdu dictionaries. The prosodic description of the key words can be significant part of dictionary entries (Khan et al., 2015). This will help the bilingual dictionary users to choose appropriate translation equivalent when translating into English while maintaining the translation precision. However, it is important to acknowledge the limitation of the data that due to the small sample size, and the potential ideological bias of the selected newspapers, the findings cannot be generalized broadly.

Thirdly, this study has a methodological implication that the previous researchers have used diverse approaches to the identification and analysis of semantic. For example, Louw (2000), used concordance reading to identify collocates of nodes, whereas Stubbs (1995) utilized purely statistical measures for this purpose. In this study, the researchers adopted a combined analytical framework that integrates both statistical and textual approaches for the identification and analysis of semantic prosody. The rationale for employing this approach was because semantic prosody is complex and cannot be fully captured through statistics alone. While collocation analysis shows word patterns, understanding meaning requires examining words in context. Therefore, combining both methods proved to provide a clearer picture of how language is used, making this approach valuable for future research (Rauf et al., 2014).

Future Recommendations

Based on the findings of this study, it is recommended that bilingual dictionaries, especially English-to-Urdu, include semantic prosodic descriptions. Many contemporary dictionaries do not focus enough on these aspects of word knowledge, which are important for understanding how words are used in context. With modern tools like large corpora and concordance software, it is now possible to add this kind of information. Therefore a new type of dictionary should be developed where each word is reviewed and labeled according to its typical semantic prosody.

Secondly, the translators should adopt corpus-based translation methods to improve accuracy and preserve the semantic prosody of the original text. This approach would help preserve subtle meanings and cultural nuances in translation. It is also recommended to build an online Urdu corpus, which would help translators, researchers, and linguists to explore the Urdu language more effectively with advanced tools. Building an online Urdu corpus would also contribute to linguistic research. This resource would give researchers the ability to analyze the language in greater depth and use modern tools to better understand its structure and usage.

It is also recommended that the future researchers can explore other aspects of lexical priming theory that were not covered in this study. This would provide a more complete picture of the theory and its applications.

This study focused on editorial texts and the sample was limited; however, the future researcher can include other genres and select huge sample size to make the findings more inclusive and widely applicable. Studying a variety of genres would give a broader view of how semantic prosody works across different contexts.

Finally, while this study used Urdu and English newspapers as comparable corpora, future research can use parallel corpora to study semantic prosody in translated texts. Parallel corpora would allow for a

clearer comparison between the source and translated texts, helping to better understand how meaning is transferred and preserved.

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