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Subnational Variations in Resilience Strategies to Adverse Contexts in Global Value Chains: Evidence from Pakistani Offshoring Services Providers

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Subnational Variations in Resilience Strategies to Adverse Contexts in Global Value Chains: Evidence from Pakistani Offshoring Services Providers

Abstract

Purpose

Drawing upon research in global value chains (GVCs), resilience, and subnational regions, we examined *how suppliers from different subnational regions operating in adverse contexts differ in successfully meeting GVC buyers' demands and becoming resilient*.

Design/Methodology/Approach

We adopted a qualitative research approach relying on 34 in-depth interviews with senior managers of offshoring service providers (OSPs) across two subnational regions in Pakistan—Karachi and Lahore. We complemented the qualitative analysis with the fuzzy-set Qualitative Comparative Analysis (fsQCA) technique to triangulate, enhance validity, and identify causal configurations.

Findings

Our results reveal that OSPs from different subnational regions adopt different approaches to tackle challenges arising from political instability and violence. GVC governance structures vary across subnational regions and, in turn, shape OSPs' resilience strategies. Karachi-based OSPs, influenced by adaptive modular governance, exhibit local agency-driven resilience, characterized by robustness and technological adaptiveness to address any direct impact of political instability. In contrast, Lahore-based OSPs, operating under relational and captive governance, adopt reputation-driven resilience, emphasizing visibility and agility to mitigate any client concerns associated with country image and enhance trust with international clients. The fsQCA provided nuanced insights into the different combinations and configurations of resilience strategies that lead to successful product delivery.

Originality

Our study contributes to the conceptualisation of disadvantaged supplier resilience as a continuous, practice-based response to adverse context, rather than a time-bound capability. Furthermore, it contributes to the emerging IB literature on adaptive GVC governance by demonstrating how suppliers in adverse subnational contexts actively shape governance dynamics from below, rather than passively receiving coordination from above. Last, it deepens the literature on subnational heterogeneity by illustrating how exposure to political instability and violence produces divergent resilience repertoires among GVC suppliers.

Keywords: GVC Governance Adaptation, Resilience, Adverse Contexts, Subnational

regions, fsQCA Pakistan, Karachi, Lahore.

1. INTRODUCTION

Many suppliers around the world are increasingly grappling with the rising prevalence and influence of adverse contexts, defined as environments *"characterized by frequent violent episodes, terrorism and other forms of conflict threatening individuals' physical security"* (Sinkovics *et al.*, 2019, pp.131-132). The expansion of global value chains (GVCs) into such contexts also heightens the risks posed by widespread disruptions (Franz *et al.*, 2024). Unlike emerging markets (EMs)—which are characterized by developing but functional institutions conducive to industrial growth, incremental innovation, and technological upgrading (Pham and Petersen, 2021; Gao *et al.*, 2023; Lorenzen *et al.*, 2020; Kumari *et al.*, 2024)—adverse contexts often exacerbate any additional vulnerabilities for local suppliers that are part of the GVCs, who must navigate risks of extreme political instability and violence (Ambulkar *et al.*, 2015; Sinkovics *et al.*, 2019; Hsu *et al.*, 2019). Consequently, suppliers operating in adverse contexts must learn to bounce back from disruptions to maintain participation in GVCs (Choksy *et al.*, 2017; Choksy *et al.*, 2022).

Much of the current GVC research conducted in the international business (IB) field primarily adopts the perspective of lead firms or multinational enterprises (MNEs), focussing on how they actively strategize to the end of managing supply-side disruptions through various governance mechanisms (Gereffi *et al.*, 2005; Ambulkar *et al.*, 2015; Gereffi, 2018; Kano *et al.*, 2022). Other studies provide insights into how local suppliers based in emerging and developing economies upgrade within GVC and examine the conditions—such as regional characteristics, GVC governance linkages, and strategic coupling—that facilitate this process (Humphrey and Schmitz, 2002; Gereffi, 2018; Khan *et al.*, 2018; Whitfield and Staritz, 2021); however, relatively limited research has examined the resilience strategies adopted by GVC suppliers operating in adverse contexts. Much of the resilience literature views resilience as a firm-level, episodic capability (Ali *et al.*, 2022), often framed within the resource-based (RBV)

or dynamic capabilities perspectives. However, these perspectives fall short of adequately explaining the emergent strategies adopted by disadvantaged suppliers (see Choksy *et al.*, 2017) in settings characterized by political instability and violence. Furthermore, in the traditional GVC literature, governance is often conceptualised through stable typologies (Gereffi *et al.*, 2005), treating coordination mechanisms as relatively fixed across time and space. However, recent scholarship in IB has been calling for more attention to be paid to adaptive governance, which evolves in response to disruption and contextual volatility (Kano *et al.*, 2022; Islam and Chadee, 2024). Recent work (Choksy *et al.*, 2017; Sinkovics *et al.*, 2019) has begun to explore how supplier resilience is enacted as a practice under adverse contexts and the adaptive role of GVC governance; yet, few studies have integrated this perspective.

Additionally, many countries characterised by adverse contexts exhibit substantial within-country variation, which complicates the operational landscape for GVCs (Hutzschenreuter *et al.*, 2020; Röell *et al.*, 2022). For instance, recent studies indicate that, in Pakistan's major cities, political and economic stability has fluctuated over the past decade (Siddiqui, 2023; Ahmad and Falki, 2023; Gayer, 2025). In adverse contexts, variations across subnational regions may result in distinct conditions for suppliers to participate and meet their global buyers' demands (Ma *et al.*, 2016; Hutzschenreuter *et al.*, 2020), which may lead them to develop distinctive forms of resilience and thus differential resilience strategies. In fact, past research emphasizes the significance of subnational spatial heterogeneity, highlighting the shift from national to subnational geographic levels in IB research and the need for a more fine-grained within-country analysis (Beugelsdijk and Mudambi, 2013; Hutzschenreuter *et al.*, 2020; Epede and Wang, 2022; Gao *et al.*, 2023).

The severity of and exposure to violent conflict may vary across subnational regions characterised by adverse contexts, leading to some suppliers being exposed more than others

to significant disruptions , such as any project delays that ripple across other GVC nodes (Sinkovics *et al.*, 2019; Tukamuhabwa *et al.*, 2017). Limited research has explored how suppliers operating in different subnational regions characterised by adverse contexts experience and survive under these challenges. This represents a critical gap in the literature, as many challenges often originate from upstream locations within GVCs operating in regions characterized by severe adversity (Dai *et al.*, 2013; Choksy *et al.*, 2017; Choksy *et al.*, 2022). Addressing this gap would provide important insights into suppliers' resilience mechanisms across varied regional contexts, thereby enhancing our understanding of GVC sustainability within complex and dynamic environments. Additionally, while the resilience of suppliers in emerging markets has been studied, there remains a lack of research on underrepresented geographical contexts, such as Pakistan (Sinkovics *et al.*, 2019), where firms operate under conditions of uneven subnational exposure to political instability and violence. This within-country variation is analytically significant yet largely overlooked in the GVC and resilience literature.

In our study, we addressed the above gap by examining how supplier resilience varies based on subnational differences. By doing so, we integrated insights drawn from the supplier agency, subnational, and GVC governance adaptation perspectives within the IB literature (Choksy *et al.*, 2022; Choksy *et al.*, 2024; Islam and Chadee, 2024). We addressed the following question: *How do suppliers from different subnational regions in adverse contexts differ in successfully meeting GVC buyers' demands and becoming resilient?* We did so by leveraging the unique context of offshoring service providers (OSPs) participating in software GVCs while operating in the differing subnational adverse contexts of Karachi and Lahore (Pakistan's two largest metropolitan cities). While manufacturing value chains have been the subject of extensive research, the emergence of service-oriented value chains has received comparatively less attention (cf. Chen and Lin, 2016; Sinkovics *et al.*, 2019; Hansen *et al.*,

2022). We conducted an exploratory qualitative study utilizing 34 in-depth qualitative interviews with Lahore and Karachi-based OSPs. We complemented such interviews with secondary data sources and performed a fuzzy-set qualitative comparative analysis (fsQCA) to verify the relationship between resilience strategies and successful international project delivery.

Our study contributes to IB research by connecting insights on GVC governance, resilience, and subnational regions to deepen the understanding of the resilience strategies adopted by disadvantaged suppliers (Choksy *et al.*, 2022; Islam and Chadee, 2024). By focussing on the contrasting subnational contexts of Karachi and Lahore, we revealed how disadvantaged suppliers navigate and adapt to localized adversity through distinct resilience strategies closely tied to governance modes. For example, Lahore-based OSPs enact reputation-driven resilience through visibility and agility, while Karachi-based OSPs develop robustness and technological adaptiveness to maintain operations amid sustained disruption. Our study makes three key contributions. First, it contributes to the conceptualisation of disadvantaged supplier resilience as a continuous, practice-based response to adverse context, rather than a time-bound capability. Second, it contributes to the emerging IB literature on adaptive GVC governance by showing how suppliers in adverse subnational contexts actively shape governance dynamics from below, rather than passively receiving coordination from above. Third, it enhances the literature on subnational heterogeneity by demonstrating how exposure to political instability and violence produces divergent resilience repertoires among GVC suppliers.

2. LITERATURE REVIEW

2.1. Subnational regions and adverse contexts

Recently, research has increasingly explored the differences between subnational regions (e.g., Rompuy, 2020) and their impact on firms' risk management strategies (Röell *et al.*, 2022).

Subnational regions differ from each other (Hutzschenreuter *et al.*, 2020; Röell *et al.*, 2022) because they often experience different economic and demographic conditions (Rompuy, 2020), are characterised by their own local cultures and social issues (Hutzschenreuter *et al.*, 2020), and may be located in different contexts. These subnational variations can result in distinct challenges, opportunities, and organizational responses. In our study, we took the view of Beugelsdijk and Mudambi (2013), who argued that spatial variation should take into consideration both differences in national context and heterogeneity within national boundaries. We focussed on an adverse context—Pakistan—which, as noted in Sinkovics *et al.* (2019), has features distinct from those found in emerging economies like China and India. We particularly focussed on the subnational variations found in two major Pakistani cities; specifically, Lahore and Karachi.

While much of the research conducted in this area has focussed on developed economies in Europe and North America, as well as large emerging markets (EMs) like China, it has often overlooked the adverse contexts that differ from those found in more stable EMs (Hutzschenreuter *et al.*, 2020; Wang and Xin, 2024). In EM contexts, firms typically face institutional voids, but they also benefit from some degree of institutional support or infrastructural development. Subnational regions are often integrated into national development goals, enabling firms to leverage supportive policies or infrastructure for growth and internationalization (Pham and Petersen, 2021; Wang and Xin, 2024). For example, regions like China's Guangdong exhibit strong industrial policies that facilitate GVC integration and innovation, even amid institutional gaps. The firms located in these regions tend to focus on upgrading their capabilities, improving their technological sophistication, and moving up the value chain. For example, Pasquali (2021) highlighted how such EMs enable firms to achieve functional upgrading and enhance their competitiveness in global markets.

In contrast, adverse contexts lack the foundational institutional frameworks or developmental policies necessary for upgrading. Instead, they are characterized by endemic political violence, weak and politicized governance regimes, and economic fragility, which constrain firms' strategies and force them to prioritize survival (Choksy *et al.*, 2017; Sinkovics *et al.*, 2019). Sinkovics *et al.* (2019) highlighted how OSPs in adverse contexts—like Pakistan—are often subjected to dual pressures: the need to meet GVC demands while simultaneously navigating institutional instability. These pressures lead to a reliance on resilience strategies, as firms must prioritize survival and operational continuity to remain viable participants in GVCs. The concept of disadvantaged suppliers, as articulated by Choksy *et al.* (2017), further complements this view. Disadvantaged suppliers are those embedded in contexts with high levels of power asymmetry and institutional deficiencies, which limits their ability to fully participate in or benefit from GVCs. Choksy *et al.* (2017) argued that such suppliers often lack the resources needed to upgrade. In adverse contexts, suppliers are disadvantaged not only by GVC dynamics but also by institutionally instable environments, wherein exposure to political instability and violence exacerbates their vulnerabilities. This dual disadvantage forces firms to adopt survival-oriented strategies, including robustness, to stabilize their operations and agility in order to adapt to rapidly changing conditions. Drawing upon Sinkovics *et al.* (2019) and Choksy *et al.* (2017), Table 1 shows the difference between adverse and EM contexts.

[Insert Table 1 here]

Following Beugelsdijk and Mudambi (2013), we argued that subnational variations within adverse contexts will have distinctive implications for OSPs across subnational regions. The varying exposure of such OSPs to political instability and violence will have distinctive implications on their participation in GVCs. For example, in Nigeria (which is typically characterised as an adverse context due to its very high levels of political instability), firms

based in the Lagos region, in the south of the country, have the advantage of access to financial services and to government-supported infrastructure, whereas those operating in other regions face insecurity, logistical unreliability, and a weak state capacity, restricting their ability to effectively become involved in GVCs (Jadallah and Bhatti, 2020)., Dai *et al.* (2013) found that subsidiaries located in or close to adverse contexts and highly exposed to threat zones are more vulnerable. In line with Dai *et al.* (2013) and Ma *et al.* (2016), we argued that the survival and success of OSPs in GVCs are jeopardised if they are highly exposed and geographically close to political instability and violence. Therefore, it is important to understand how differences in OSPs' exposure to political instability and violence may shape their survival in GVCs. In this respect, we responded to the call made by Hutzschenreuter *et al.* (2020) by exploring how the domestic experiences of firms (in our case, OSPs in Pakistan) across subnational regions (Karachi and Lahore) may shape their international trajectories and success (their survival and ability to meet GVC requirements and demands). Furthermore, we also investigated the claims made by Ma *et al.* (2016) on whether firms' international success (in terms of their survival in GVCs) are shaped by favourable/unfavourable subnational institutional environments.

2.2. *Governance and Supplier resilience in GVCs*

GVC research examines how developing economy suppliers access global markets, the conditions under which suppliers coordinate with foreign buyers, the way their interactions are governed, and how governance arrangements may benefit/hamper EM suppliers upgrades (Humphrey and Schmitz, 2002; Gereffi, 2018; Fransen *et al.*, 2019; Whitfield and Staritz, 2021). Scholarship suggests that different governance structures shape the demands and the challenges suppliers face to upgrade in GVCs (Gereffi *et al.*, 2005; Islam and Chadee, 2024; Wang and Xin, 2024).

Gereffi *et al.* (2005) developed a GVC governance framework that involves three types of alternative governance relationships positioned between the two poles of pure markets and

hierarchies: *modular, relational, and captive governance*. In modular governance, lead firms outsource the work to suppliers that possess specialized expertise, primarily handling the complexity of international transactions through codification. Under relational governance, lead firms and suppliers are intensively involved in explicit coordination due to the tacit nature of the knowledge exchanged, underpinned by trust and geographical proximity. In both modular and relational GVCs, the power asymmetry between buyers and suppliers is usually low. In captive governance, lead firms drive the relationship by implementing strict standards (strong codification) on less capable suppliers. According to the literature, different governance structures entail different demands and challenges for suppliers (Gereffi, 2018).

Both the GVC and offshoring literatures have emphasized the need to contextualize GVC governance, particularly in those cases in which institutional conditions (Choksy *et al.*, 2024) and political instability (Sinkovics *et al.*, 2019) may constrain the suppliers' ability to meet buyer demands. Choksy *et al.* (2017) highlighted how, in such settings, disadvantaged suppliers struggle to meet buyer expectations, as their capacity for adaptation is constrained by both local risks and GVC pressures. In the offshoring literature, Hong *et al.* (2022) stressed the importance of alignment between offshoring governance and home institutional conditions. They argued that governance misalignment—any mismatch between offshoring governance and institutional conditions—can have negative consequences for firm performance. Lu *et al.* (2020) found that offshoring customers can develop negative perceptions of offshoring services and affiliate them with any negative conditions found in the home countries of the OSPs. The governance structures and power asymmetries found within GVCs further shape how disadvantaged suppliers respond to institutional instability, as certain governance types may constrain their ability to develop resilience, whereas others provide opportunities for adaptation. For instance, suppliers embedded in captive or relational governance structures may depend on reputation-driven resilience to maintain buyer trust, whereas those operating under

modular governance may showcase robustness to sustain operations under adverse conditions. Along the same line, Sinkovics *et al.* (2019) argued that Western GVC buyers are hesitant to do with business with Pakistani OSPs due to the country's media-propagated negative reputation in relation to terrorism and political instability. These insights underscore the importance of integrating governance and institutional perspectives to understand how suppliers manage these dual challenges.

In this study, we drew upon recent GVC governance literature in the IB field, which is shifting the focus from rigid governance models to adaptive processes that evolve in response to external volatility. Recent studies have contested the notion that, in GVCs, resilience is inherently determined by fixed governance structures such as relational or modular structures (Kano *et al.*, 2022; Islam and Chadee, 2024). While GVC governance frameworks provide valuable classification systems, they fall short in capturing the dynamic strategies employed by firms to navigate any environmental risks. In contrast to the traditional GVC literature, which assumes that GVC governance is dictated by lead firms, we drew upon the recent studies that have stressed the importance of a) context and need for adaptive GVC governance mechanisms and b) suppliers' agency to strategically adapt to volatile conditions (Suder *et al.*, 2024; Choksy *et al.*, 2024).

Islam and Chadee (2024) argued that the successful navigation of environmental risks requires governance mechanisms that are not only robust but also adaptable, enabling rapid adjustments to unforeseen challenges and facilitating the resilience of value chain actors, including developing country suppliers. Kano *et al.* (2022) argued that resilience is shaped by managerial governance adaptation, which—unlike static governance structures—are dynamic and adaptable, and thus suited to deal with environmental disruption, such as large-scale crises or political instability. Verbeke *et al.* (2021) highlighted the need to understand governance mechanisms under contexts of high uncertainty. Kano *et al.* (2022) emphasized the importance

of relational elements such as iterative communication and collaborative strategy in mitigating any uncertainties inherent in governance. Pananond *et al.* (2020) highlighted how governance decisions reflect strategic trade-offs between autonomy, knowledge assimilation, and risk mitigation, rather than mere efficiency considerations. Collectively, these studies illustrate how governance adaptation is not universal but context-specific and serves as a vital mechanism for supplier resilience in unstable settings.

At its core, resilience is about a firm's capacity to persist, adapt, or transform amid adverse change (Wieland and Durach, 2021). As such, it enables firms to cope with any unexpected circumstances and bounce back from adversity. Our study's level of analysis is supplier resilience within GVCs (Choksy *et al*, 2025). Previous research on resilience has primarily considered it to be a firm-level capability. In this way, they have failed to consider the interlinkages between GVC governance and resilience, which is essential when understanding resilience at the supplier level. Recent research conducted in the IB field—including Choksy *et al* (2025), Islam and Chadee (2024), Choksy *et al.* (2022), Choksy *et al.* (2017) and Sinkovics *et al.* (2019)—has inter-related GVC governance, supplier agencies, and local institutional context. Suder *et al.* (2024) further argued that suppliers are not passive recipients of governance dictates, but active agents who influence governance structures, challenging the traditional focus on lead firm dominance. Sinkovics *et al.* (2019) identified two types of OSPs under adverse contexts, whereby captive GVC linkages and suppliers' strategic intentions shape their micro-level practices to initiate and maintain connectivity with GVC buyers.

Drawing from the supplier agency perspective in GVC, we considered supplier resilience as enacted in everyday practices (Kalantaridis *et al.*, 2011; Choksy *et al.*, 2017), viewing suppliers as purposive agents contextualized in GVC governance and subnational conditions. This means that suppliers and their resilience strategies are not singlehandedly

prescribed by GVC governance and subnational regions, however influential, and have the agency to respond to challenges. To this end, we defined resilience strategies as sets of emergent ones suited to respond to the challenges posed by subnational adverse contexts and adapt to GVC governance linkages to meet international clients' demands (Choksy, 2015).

3. CONTEXT AND METHODS

3.1. Research context

Previous studies have highlighted the adversity of the Pakistani context, focussing on factors ranging from political instability (see Sinkovics *et al.*, 2019) to institutional voids (Choksy *et al.*, 2024). In line with our research objectives, we focussed upon Pakistan's two largest metropolitan cities—Karachi and Lahore—which exhibit varied political and economic landscapes and are home to most of the suppliers that are part of GVCs. The significant shifts that have characterised the political and economic environments of Karachi and Lahore in recent years made it necessary to take a granular approach to analysing their variations.

As Pakistan's largest city and primary commercial hub, Karachi is characterised by persistent and ongoing political instability, criminal activity, and urban unrest. Lahore, in contrast, has remained relatively stable, while experiencing intermittent disruptions due to political protests and religious movements. The rise of movements such as Tehreek-e-Labaik Pakistan (TLP) has led to episodic unrest, particularly affecting transportation and logistics-dependent businesses (Ahmad and Falki, 2023; Sarwar *et al.*, 2024; Malik and Cheema, 2024). Additionally, adjacent areas, such as Raiwind and Sheikhupura, have reported an uptick in criminal activities, impacting industrial operations. Despite these challenges, Lahore has continued to emerge as a major IT and services hub, attracting investments and fostering innovation (Pakistan Economic Survey, 2024).

Karachi, which has historically perceived as volatile due to ethnic and political conflicts, has seen notable security improvements since 2013 following targeted law

enforcement operations (Malik and Siddiqui, 2019; Felbab-Brown, 2022; Siddiqui, 2023; Gayer 2025). Commercial hubs within Karachi, such as Saddar and Gulshan-e-Iqbal, have experienced a decline in violent incidents, enabling businesses to operate with greater stability. However, areas like Korangi and Lyari continue to face security challenges, influencing firms' operational strategies. Although political instability, in terms of crime rates and security, varies within different areas of Karachi, recent reports confirm that, on average, Karachi experiences persistent levels of political instability, with frequent protests by civil society and social and political activists. According to a Forbes 2024 report on the riskiest cities in the world, Karachi was ranked the second riskiest city in the world after Venezuela's Caracas (AFPRelaxnews, 2024).

This subnational divergence highlights the importance of a location-specific understanding of resilience strategies, whereby Karachi firms adapt to prolonged security uncertainties while their Lahore counterparts emphasize transparency and flexibility to mitigate intermittent issues from political instability. In our study, we leveraged these insights to refine our analysis. These localized resilience strategies highlight the need for firms operating in adverse context to adopt region-specific approaches to ensure continuity in GVC participation.

3.2. Research design

Due to the limited number of studies conducted on this topic, we adopted an exploratory qualitative approach to understand the resilience strategies adopted by software services suppliers that are part of GVCs and located in Lahore and Karachi. We followed up our qualitative study by performing a fsQCA to triangulate our results on the relationship between suppliers' resilience strategies and their successful delivery of projects to international clients (Sinkovics *et al*, 2022).

Our research was aimed at understanding how suppliers located in two distinct subnational regions in an adverse context develop resilience strategies to meet GVC demands.

Given that limited prior research had addressed how subnational variations impact supplier resilience within GVCs, an inductive, qualitative approach was essential to uncover the nuanced, context-specific factors influencing resilience strategies in these distinct regions (Eisenhardt, 1989; Aguzzoli *et al.*, 2024;). Our qualitative approach enabled us to gather in-depth insights from supplier perspectives, capturing unique regional dynamics that would have been challenging to assess with purely deductive, theory-driven methods. This inductive phase laid a rich foundation (Aguzzoli *et al.*, 2024) for understanding the core resilience strategies employed by suppliers, which may not align directly with existing theories due to the complexity and specificity of the subnational contexts.

3.2.1 Sampling and data collection

Our sampling approach was focussed on small and medium-sized software services firms with 10 to 300 employees, providing 'custom software development' and 'product development' services to global clients across mobile and web platforms, particularly in the enterprise domain, in which software developers focus on the business needs of their clients (see Section 4.1 for more details on the enterprise software value chain). These firms are vulnerable to adverse local conditions—such as power outages, political strikes, psychological stress, unstable internet connectivity, and negative reputational perceptions—which significantly hinder their capacity to deliver projects reliably and maintain client relationships. These challenges are especially consequential for more complex and interaction-intensive project types, such as end-to-end product development and custom software development (see Section 4). We selected our sample firms based on their engagement in GVCs, whereby they supplied software solutions to lead firms in advanced market economies, including the US, the UK, and other countries in Western Europe. Our sample selection enabled us to study the resilience strategies adopted by firms embedded in volatile subnational contexts, yet catering to demanding international markets. We strategically chose our sample from Karachi and Lahore,

which enabled us to conduct a meaningful comparison between the former's adaptive modular governance and the latter's relational/captive governance. This contrast enabled us to isolate the subnational variations in governance dynamics and to assess how these differences shape the resilience strategies of suppliers embedded in distinct political and institutional environments (see Section 4). Furthermore, we selected small and medium enterprises (i.e. those employing 10–300 employees).

In 2018, the lead researcher conducted 34 interviews with key employees and decision-makers from 17 software service providers (SSPs)—two from each firm—including top management team members and project managers. The interviews, which were conducted face to face, lasted between 60 and 90 minutes and were designed to elicit detailed information on each firm's resilience strategies, operational challenges, and approaches to managing disruptions. Nine of the software suppliers operated in Lahore (OSPs #B, #F, #G, #H, #L, #M, #J, #K, and #Q), and eight in Karachi (OSPs #A, #C, #D, #E, #I, #N, #O, and #P). Table 2 provides a description of our sample firms' case data, subnational regions, and clients' regions. We conducted our interviews following a semi-structured in-depth protocol.

[Insert**Table** Table 2 here]

To complement the interviews, we collected supplementary qualitative data through non-participant observation and secondary data sources. We reviewed each company's website, analysed news articles related to their operations, and monitored their social media accounts to capture their positioning, service offerings, and publicly available information on their operational status (Sinkovics *et al.*, 2008). Furthermore, in 2021 and 2022, we exchanged emails with at least one participant in each OSP, validating some of the main insights that had emerged from the 2018 interviews. This triangulation with secondary data and email exchanges enabled us to validate our interview findings, enhance the richness of our data, and gain a thorough understanding of each firm's resilience strategies within the broader GVC context.

3.2.2 Interview development

Taking the perspectives of the top management member and project manager provided us with generic-level challenges and strategies while investigating the same for specific vendor teams working on client projects primarily in US, the UK, and the rest of Europe. We started by asking general questions about the respondents and their companies. We then asked questions focussed on the process—i.e., on how their firms identified, transformed, and exploited external knowledge to create new products. Subsequently, we asked scenario-based questions focussed on: a) what factors hindered their firms' ability to meet their international clients' requirements; b) the role played by political instability; and c) how their firms addressed those challenges. Our interviews covered client interactions, project delivery processes, and adaptation to political and social disruptions, providing a comprehensive view of the strategies adopted by each firm to navigate adverse contexts. During the interviews, we used the *courtroom* style of interviewing, focussing on specific events and examples. The lead researcher, who is fluent in both Urdu and English, conducted interviews in both languages. To ensure the validity and dependability of the data, the lead researcher then translated all the Urdu interview transcripts into English. The transcribed and translated documents were sent to the participants (who were well versed in English) to ensure that they matched their responses. All the documents were stored in NVivo, a computer-assisted data analysis software (CASDAQ).

3.2.3 Trustworthiness

The trustworthiness of our data and analysis was based on the criteria provided by Sinkovics *et al.* (2008). This included assessing the credibility, dependability, transferability, and conformability of our qualitative data throughout their collection and analysis process. In terms of transferability, besides being unique and well in line with our research question, the

subnational adverse contexts of Karachi and Lahore is also transferable to other similar ones, including Colombo in Sri Lanka, Maharashtra in India, and Dhaka in Bangladesh.

Regarding dependability, we conducted in-depth face-to-face interviews primarily with senior managers (senior project managers, senior product managers, CEOs, etc.) or owners who had in-depth insights into the projects and their linkages with international clients. To improve the *credibility* criteria of trustworthiness and with the aim of extending theoretical insights, we based our interview questions on the pertinent theoretical literature, including that related to GVC governance, adverse contexts, and organizational resilience. To ensure *functional and conceptual equivalence*, we used company websites and reviewed software industry literature to operationalize our interview questions in order to make them suitable for participants working in the industry. Finally, we sent a research outline and interview questions in advance to meet *conformability* criteria, to ensure that both researchers and participants would have a similar understanding of our research aims and objectives.

3.2.4 Data analysis

To enhance the quality of the data analysis, we used the NVivo 12 computer-assisted qualitative data analysis (CAQDAS) software tool (Sinkovics *et al.*, 2008). We coded the data into first-order categories such as 'client exit in the middle of project' and 'incorporating changes not decided earlier', among others. Following this approach, we performed axial coding and compared both similarities and differences between the concepts that emerged from the first-order codes into second-order themes, such as 'multiple skills', 'client concern', and 'agility in requirement changes'. We utilized the NVivo 12 'matrix' query functions to identify the relationship between different first order themes and translate them into second order ones. Furthermore, we used the matrix query and classification functions to link specific second-order themes to specific software firms as part of a 'selective coding process'. As a result, we

identified different resilience strategy patterns between the Karachi and Lahore-based suppliers.

Due to the study's focus and the unique nature of the research question, we performed a thematic analysis followed by fsQCA. A key difference between the two methods is that thematic analysis provides rich, nuanced data. While fsQCA thematically analyses causal relationships, identifying the different configurations that constitute sufficient and/or necessary conditions for the outcome of interest (Greckhamer *et al.*, 2018). By integrating the two methods, we were able to combine the depth of qualitative analysis with the systematic rigor of comparative analysis (Ragin, 2009). In other words, thematic analysis helped us uncover the 'what' and 'why' within our qualitative data, while fsQCA identified 'which combinations' of factors contributed to specific outcomes. The use of fsQCA further enabled us to identify configurations of conditions—such as robustness, adaptability, visibility, and agility—that were sufficient and necessary for successful project delivery within our two focal different contexts, thereby providing a structured yet flexible approach to exploring multiple equifinal pathways toward resilience (Ragin, 2009). Our decision to combine qualitative methods with fsQCA was guided by the need to investigate complex configurations underpinning our sample firms' resilience strategies and enable the emergence of novel configurations relevant to each region, elaborating theory that is both context-specific and practically relevant. This combined methodology thus provided a robust and theoretically grounded framework along with analytical triangulation to expand and advance the literature.

3.2.5 Rationale for the Use of fsQCA.

In IB research, fsQCA is increasingly recognized for its capacity to capture complex, context-specific configurations of factors, making it well-suited for understanding resilience in adverse subnational environments (Fainshmidt *et al.*, 2020). Researchers increasingly tend to use complexity theory to characterize particular business situations and then employ the fsQCA

technique to seek configurational solutions to them (Kumar *et al.*, 2022). Several studies have applied fsQCA to interview data to explore complex causality and gain deeper insights (e.g., Primc and Cater, 2015; Balodi, 2016; Rekik and Bergeron, 2017; Naims and Eppinger, 2022; Caldeirinha *et al.*, 2024). The use of fsQCA was particularly relevant for our study as it enabled us to examine multiple interdependent conditions across different regional contexts, providing a nuanced view of how unique resilience strategies interact with regional factors to produce successful project outcomes. It also enabled us to validate our main conclusions, refine our assumptions, and enhance our findings (Ragin, 2009). Notably, as it is based on a statistically-informed configurational approach, fsQCA has emerged as a highly objective technique suited to derive predictive conclusions (Kraus *et al.*, 2018). It offers a distinct advantage in illustrating the combinations of conditions that lead to the presence or absence of a positive outcome (Huarng and Yu, 2017).

4. FINDINGS

Our findings suggest that GVC suppliers (hereafter OSPs) based in Karachi and in Lahore are exposed to different subnational adverse contexts (i.e., exposure to violent incidents) and GVC governance structures, which shape their distinct resilience strategies. Our interviews analysis highlighted two types of projects in software GVCs: *end-to-end product development* (EEP) and *custom software development* (CSD) projects. EEP projects are complex endeavours in which suppliers receive *undefined product ideas* from lead firms and cover all the other software development functions and tasks, including analysing the business requirements and translating them into technical specs and software development[1]. In CSD projects, suppliers receive *business and software design requirements* from geographically distant lead firms and

[1] Software development value chains involve both technical and non-technical functions. Lema (2010) identified two key phases in the software development projects of geographically distributed project teams—architecture and implementation—each of which comprises multiple function tasks. The *architecture* phase places the software development process within its larger context. As the software relates to a larger system (computer, video games, animation, and mobile), the first function within the architecture phase involves the need for the software company to explore and identify the business problem (i.e., to engage in *business requirement gathering*) including the aims and objectives of the project from a business perspective. The outcome of this process is a comprehensive business requirement document (Choksy, 2015; Sinkovics *et al.*, 2019).

are primarily responsible for the low-level design (translating software design requirements into software development specifications) and implementation of software development[2]. Table 2 summarises the differences between EEP and CSD projects in terms of tasks covered, codifiability, coordination, and learning.

[Insert Table 3 here]

The rest of the section details the interdependence relations between exposure to adverse subnational contexts and GVC governance linkages. This is followed by the distinctive resilience strategies adopted by the GVC OSPs (see Tables 4 and 5 for the summary).

[Insert Tables 4 and 5 here]

4.1. Interplay of subnational conditions, GVC governance, and Resilience for Karachi-based OSPs

As a result of being continuously exposed to adverse contexts and persistent instability, our sample Karachi-based OSPs primarily faced direct impacts on their operations which hampered their project delivery and quality. This persistent political instability and its direct impact upon Karachi OSPs hindered the delivery of their EEP projects, which require a stable local environment. Our Karachi-based sample respondents reported that many employees had left their organisations because they had wanted to move out of the city to work in politically secure locations. These conditions had hampered our sample Karachi-based OSPs from meeting project deadlines and had often caused their international clients to drop projects altogether. Furthermore, they had also created issues in relation to retaining skilled labour in the more knowledge intensive sections of the software value chain, including software design and architecture.

[2] The second function, which is termed technical specification design, involves aligning the business requirements with the needs of the larger system—e.g., the device and other software/hardware requirements (Lema, 2010)—but also understanding the social context and connecting user needs with software functionality. As such, it bundles two software design tasks—high-level design, which translates the business requirements into software design documents, and low-level design, which translates such documents into software development requirements. In the implementation phase of software development, software developers and programmers use the software development requirements and engage in coding, testing, and regularly updating the software (Choksy *et al.*, 2024; Sinkovics, *et al.*, 2019).

It is difficult to implement a global project as a small organization in a city like Karachi … We spend months training our employees, but it is very difficult to retain them as they are looking for opportunities outside of Karachi (OSP#A).

Political instability in Karachi is drastic. This level of violence in the city blocks the minds of our employees (OSP#O).

Our Karachi-based sample OSPs were therefore mainly involved in providing *custom software development* services, being responsible to engage in low-level design and software development tasks that included programming, coding, and testing. Their international clients provided them with the high-level design of the software and requirements, and our sample Karachi OSPs were responsible for translating those requirements into working software solutions (low-level design) and implementing them (programming, coding, and testing).

4.1.1 Adaptive modular governance as an external driver of resilience

From a traditional GVC perspective, the relationship between our Karachi-based sample OSPs and their international clients can be characterized as *modular GVC governance*, whereby the complexity of global knowledge required for custom software development was primarily handled through the explicit codification of software design, specification, and architecture by the lead firm (Gereffi *et al.*, 2005; Gereffi, 2018).

First thing is the requirement need. We convert those requirements into features and functionality (OSP#C)

There was a requirement that every query should be answered within a certain limit according to the service agreement (OSP#D)

Furthermore, due to the interactive nature of the low-level design tasks of CSD projects, all the internal team members of our sample OSPs and their international clients needed to work closely to effectively coordinate and to minimize any errors in the software development projects. These conditions made it important for employees to be based in the same location and effectively communicate with their clients.

However, the employees of our Karachi-based sample OSPs would often not turn up for work when violence broke out or when local political faction strikes were going on. There was a degree of uncertainty about whether some employees would be able to regularly travel to the office. As one of the owners of our Karachi-based sample OSPs indicated:

> *The way it harms us, for example, is when there is a strike in Karachi, roads are blocked, people cannot travel, so this is a big problem (OSP#E)*
>
> *In the early stages of our operations, we realized the limitations of Karachi transport. To call people to the office is very difficult. (OSP#I).*

In line with Kano *et al.* (2022) and Islam and Chadee (2024), we observed *adaptation in governance linkages* between our Karachi-based sample OSPs and their international clients across to two GVC governance factors: *codification* and *explicit coordination*. For instance, one of our Karachi-based sample OSPs was developing a health app for a Dutch client. Despite the availability of the design requirements from the client, the OSP had to ensure that the implementation part would take into consideration the context of the healthcare industry in the Netherlands and the user experience of Dutch healthcare users. Therefore, there was a need to iteratively develop software demos that could be sent back to the client, who could then provide feedback on whether the demo met the expected design requirements and captured its users' expectations.

This short case showed how our Karachi-based sample OSPs had to rely on *iterative but structured codification* when engaging in low-level design tasks to ensure a smooth transition from design to development activities. Although the need to coordinate with the international clients was not very frequent, there was a need to set milestones in the form of asking further questions on the initial software requirements, developing software demos (as mentioned above), and implementing any client-provided feedback related to the projects' progress and to whether the OSPs were on the right track. We termed this type of governance linkage between our Karachi-based sample OSPs and their international clients as *adaptive*

modular governance, whereby the dominant form of governance remained codification but, unlike in the traditional forms of modular governance—in which OSPs independently implement an initial set of qualifications in adaptive modular governance—there was a need to continuously refine and update specifications through continuous and structured coordination.

> *We had to send the application demo screen by screen … they gave us feedback … we had to follow each step used by company standards (OSP#I)*
>
> *We iteratively get new software demos and send them to our clients. And they give us structured feedback on what they want to change (OSP#O).*

For instance, our Karachi-based sample OSPs employed digital tools such as Basecamp and JIRA to facilitate structured client collaboration:

> *How we normally set up our project is that we give the customer access to base camp… This is an organised platform especially for offshoring clients (OSP#A).*

Further, structured and codified interactions were maintained through systematic updates and feedback processes facilitated via cloud-based platforms:

> *We started to use XYZ as a management system online and it went so much better. It was unbelievable because … every chain of email is available to everybody doing that part of the work and we can see the latest immediately without going back through emails (OSP#C).*

Once the low-level design requirements were clear and the projects were ready for the programming and coding tasks, our Karachi-based sample OSPs independently worked on them without much coordination with their international clients. The software development implementation tasks reflected modular linkages, wherein strong capabilities in programming and coding were embedded in the local environment.

4.1.2 Agency-driven strategies as internal drivers for resilience

Internally, our Karachi-base sample OSPs exhibited a local agency-driven resilience whereby they proactively shaped their responses to define their own paths to success in GVCs. Their resilience was strongly rooted in their responses to their specific local context and met the demands of modular governance. They demonstrated agency-driven resilience through locally

embedded robustness and technological adaptiveness. Our Karachi-based sample OSPs adopted technological adaptiveness in their day-to-day practices—i.e., they found quick ways to adapt technological tools to address any process disruptions. The first was telecommuting, whereby they provided their employees with telecommuting systems that reduced their dependency on office space to fulfil their assigned tasks. For example, OSP#D had installed backup internet and generators to ensure that its workers would not lose coordination while working from home. OSP#D's teams had visited its employees' homes for an infrastructure survey. Based upon the visit, they had designed telecommuting infrastructural requirements in response to what they had needed and had invested in creating a smooth telecommuting environment.

The second was *cloud-sharing coordination,* which included the development of a document management system. Our Karachi-based sample OSPs had consistently fulfilled their clients' demands through these coordination systems and had addressed any process disruption. For example, OSP#A had invested in high-speed laptops that supported cloud sharing, enabling its employees to coordinate their complex work requirements in real-time. As a result, they had been able to maintain the continuity of their clients' work and meet their demands.

> *We are one of the heaviest users of Google Docs. 90% of our data is stored in Google Docs. (OSP#A)*
>
> *Sending Excel files at night, updating in the morning … we realized it was not going to work… so we started using document management systems. (OSP#D)*

Robustness ensures project continuity and stability, which is reflected in OSP behaviour. Robustness is reflected in two practices: *a) working patterns* and *b) cognitive capacity to cope with pressure.* We found that robustness was particularly important for our sample OSPs to align their practices in order to resist the impact of process disruption on the outcome of small-sized projects lasting from one to three months. Therefore, should a violent

incident occur or a political party announce city-level strikes, these locally embedded practices facilitated our sample OSPs to continue working and stabilize their software projects.

The first type of practice pertained to the OSP's working patterns under disruptions. Deadlines are critical in software development projects. When a disruption had emerged, our Karachi-based sample OSPs had decided to change their working patterns around the need to complete their projects on time, ensuring that all requirements were met. For example, some had decided to put in overtime work to ensure that they would meet their deadlines. We found that, in doing so, our Karachi-based sample OSPs had developed a collective sense of agreement regarding the appropriateness of this response with the individuals working on projects. For example, OSP#D had embedded gaming evenings and social get-togethers as part of the overtime work. OSP#P had called in all its employees during weekends and paid significantly higher wages to put in the extra working hours, ensuring that its clients' projects would be finished on time. One of the managers remarked that:

> *The entire company works on weekends if we lose days during the week. The customers really appreciated that, despite strikes in the city, the entire team worked all night. Half from home and half from the office, but they were doing their job (OSP#A).*

The second practice was robustness in our Karachi-based sample OSPs' cognitive capacity to cope with pressure. They would not come under pressure when a project was delayed due to an incident in Karachi. For example, OSP#N reassured its clients by showing them what they had done to date, informing them of the political/violent incident, and negotiating extensions to the projects' deadlines. The ability to cope with any pressures accumulated via process disruptions was something we found to be unique about our Karachi-based sample OSPs. Whereas GVC research shows how buyer pressure to meet demands on OSPs can have a ripple effect on workers (Humphrey and Schmitz, 2002), we found that our Karachi-based sample OSPs had motivated and affirmed the hard work of their workers to

avoid coming under the pressure of the clients and had trained them in ways of communicating with their clients' teams. On the other hand, we found the evidence from our Lahore-based sample OSPs to be in line with that in the GVC literature, whereby the confirmation of buyer requirements was critical despite the emergence of any disruptions.

4.2. Interplay of subnational conditions, GVC governance and resilience for Lahore-based OSPs

Lahore's intermittent political instability was found to rarely have any direct impact on our Lahore-based sample OSPs' projects. They were able to handle EEP projects, including both the software architecture and implementation functions. Although our Lahore-based sample OSPs were not frequently exposed to conditions of violence and instability, their clients were very concerned about whether their projects would be delivered on time and meet the required quality should a violent incident take place or due to the negative image associated with Pakistan's political instability.

International client concerns were found to impact our Lahore-based sample OSPs much more than their Karachi-based counterparts, as the latter's modular linkages did not require them to coordinate as frequently with international clients on software design and specification definitions. These challenges inhibited the ability of our Lahore-based sample OSPs to interact physically with their clients and coordinate effectively. A respondent of one of our Lahore-based sample OSPs, which was working in the gaming industry for North American clients, stated:

> *Let us say, if it is Vietnam or the Philippines, Americans have no problem taking an airplane and going to the Philippines for 2-3 weeks and interacting with their offshore team. It is the unwillingness of our international clientele to feel safe in coming to Pakistan (OSP#K).*

4.2.1 The dynamics of relational and captive governance as external drivers of resilience

Participation in EED projects was found to lead to more cooperative links between our Lahore-based sample OSPs and their lead firms (international clients). However, the skills needed for

software design were not accessible in the local environment of Lahore, nor were they available at the national level. These rely on the technical expertise of software architects and designers and on the final user for whom the software is developed. Therefore, our Lahore-based sample OSPs depended on their lead firms as global sources of knowledge. Based upon this, the linkage between our Lahore-based sample OSPs and their international clients was found to be characterized as *relational GVC governance* (Gereffi *et al.*, 2005; Gereffi, 2018). The complexity of software product development was primarily handled through the upgrading of the OSPs' learning and capability via frequent interactions with their lead firms to connect the latter's global software design and architecture knowledge with local software development knowledge. These findings also suggest those aspects in which the local knowledge sources were weak or poorly embedded in the network. Global knowledge pipelines can thus be seen to play a crucial role in the development of OSPs' capabilities in different areas (Khan *et al.*, 2018).

Due to the concerns held by international clients when working with our Lahore-based sample OSPs, we also observed elements of captive governance in the interaction between them. The distinctive GVC governance factor was reflected in the *nature of explicit coordination.* In relation to identifying the business requirements and the design of technical specifications, the explicit coordination between our Lahore-based sample OSPs and their international clients resembled relational linkages, wherein the knowledge exchanged to manage the complexity of the task was the dominant driving force.

> *Client came up with very brief requirements ... we created markups and designs ... we convinced them to go with a different implementation. (OSP#F)*

However, in relation to managing client concerns, the explicit coordination resembled captive linkages, whereby the clients exercised their power, intensely monitoring the projects.

> *They want us to be proactive in updating them every day and show them what we are doing (OSP#G).*

4.2.2 Reputation-driven strategies as internal drivers of resilience

The resilience strategies employed by our Lahore-based sample OSPs were found to be fundamentally shaped by the need to actively manage their global reputation and build trust within a GVC context characterized by relational governance. The OSPs' resilience was found to be centred on their proactive addressing of any negative global perceptions held by their international clients and demonstrating their own reliability in remote collaboration. Therefore, unlike their Karachi-based counterparts, our Lahore-based sample OSPs' spatial focus was found to be on managing their global reputation via *visibility and agility* across their local operations and global interactions with lead firms when addressing demand-side disruptions. *Visibility* here is defined as *the capacity of OSPs to make the software product's supply chain visible to the lead firms via digital platforms and assure clients that product requirements are being met*. Two practices were found to be prominent for our Lahore-based sample OSPs to demonstrate visibility*: a) transparency of project teams' skills and the process of software development and b) traceability—real-time project visibility and progress*. We found *transparency* to be a crucial practice in which our Lahore-based sample OSPs engaged to clearly show their skills and resources, how their team would design the software for the international client, the milestones whereby they would provide a demo of the software and other aspects of software development.

> *We proactively work with them, show them that we are doing their work, jump in, and manage their project for them. We are very transparent about our resources and what we are offering (OSP#H).*

Regarding *traceability,* our sample Lahore-based OSPs *enabled their international clients to see their progress in real-time by making their teams available outside of work hours and providing regular updates and connecting via digital platforms.* This traceability was manifested in our Lahore-based sample OSPs' willingness to report the projects' details and progress step-by-step. This ranged from investing in time-zone issues, making sure that they

were available to their clients 24 hours a day, to the development of online systems whereby buyers could see the progress of the whole software development on their side.

> *To mitigate time differences, you must extensively train your people and shift work schedules to overlap your team's schedule with the customer's. You must give your customers more contacts to communicate with, normalize communication channels, and constantly tweak your team's schedule to accommodate changes on the other side (OSP#B).*
>
> *We do a 10-minute stand up daily. Our client/partner usually joins us as well or we do an hour-long video call (OSP#F).*

Second, our Lahore-based sample OSPs adopted ***client agility****,* referred to as *the OSP's capacity and willingness to incorporate changes aimed at meeting their international clients' emerging needs, including changes to client requirements, changing user requirements, workload, and offering broader services and skill*s. The OSPs were found to be able to incorporate new global demands in the middle of projects or to respond to sudden changes in demands. For example, OSP#J had developed a website platform for an event management client in the UK. The owner of OSP#J expressed that the UK client frequently used to change the software requirements or asked for additional work. His OSP had showed a willingness to change its strategy and working patterns.

> *The client frequently used to change the software requirements or ask for additional work; we adjusted our strategy (OSP#J).*

4.3. Analysing resilience strategies and successful project delivery using fsQCA

Our main research question pertained to *how GVC suppliers from two different subnational environments differ in coping with an adverse context and successfully meeting GVC buyers' demands.* Our empirical analysis identified successful project delivery as a good indicator of the suppliers' capacity to meet GVCs' diverse demands. Successful project delivery meant that the suppliers a) completed the projects and delivered them on time to their international clients and b) met their clients' quality and design requirements.

As a result of their strong robustness and adaptation, our Karachi-based sample OSPs had improved their overall product delivery and success by tackling process-related disruptions. Our qualitative analysis also showed that visibility and agility had helped our Lahore-based sample OSPs to tackle any demand-side disruptions and successfully meet their international clients' demands on time. Based on the above qualitative analysis, we developed six propositions that we analysed using the fsQCA technique:

P1. *Visibility leads to successful product delivery to international clients.*

P2. *Agility leads to successful product delivery to international clients.*

P3. *Visibility and Agility in combination lead to successful product delivery to international clients.*

P4. *Robustness leads to successful product delivery to international clients.*

P5. *Adaptation leads to successful product delivery to international clients.*

P6. *Robustness and Adaptation in combination lead to successful product delivery to international clients.*

To convert our qualitative interview data into fuzzy sets, we adopted the technique proposed by Basurto and Speer (2012). The process involved identifying measures, setting anchor points, coding interviews, summarizing data through classification, and assigning and revising fuzzy set values. We identified four sets of resilience strategies (conditions): Adaptation and Robustness for our Karachi-based sample OSPs and Agility and Visibility for our Lahore-based ones. Our dependent variable was successful delivery (outcome) (Kapsali *et al.*, 2019). To measure each set of strategies, we chose a four-fuzzy score scale (Ragin, 2009). We thus scored the frequency of their use in the interviews' transcription.

To calibrate our data, we based the constructs for the independent and dependent variables on the sets of clauses, and their scores on a four-point fuzzy coding scale (0, 0.33, 0.67, 1), according to Ragin (2009). In particular, we assigned the following scores to our

variables: 0 (full non-membership) to those that were *not* mentioned, which we deemed irrelevant; 0.33 (mostly out) to those mentioned *once*, which we deemed to be of low importance; 0.67 (mostly in) to those mentioned *twice*, which we deemed to be moderately important , and 1 (full membership) to those mentioned *three times or more* , which we deemed to be highly important and relevant. Similarly, to assess delivery success, we established anchor points as follows: 0 for poor delivery (e.g., frequent delays), 0.33 for average delivery (e.g., occasional delays or minor issues), 0.67 for good delivery (e.g., on-time delivery with minimal issues, meeting customer expectations), and 1 for excellent delivery (e.g., fast, reliable, and error-free delivery with high customer satisfaction). Figure 1 illustrates the fsQCA process we adopted.

[Insert Figure 1 here]

Comparative research assesses the connections between variables based on conditions of sufficiency and necessity (Fainshmidt *et al.*, 2020). fsQCA is a mixed-method, and its main purpose is to identify the conditions necessary and sufficient for the outcome. Furthermore, fsQCA may address complicated configural connections characterized by equifinality, which entails the emergence of the same outcomes from several combinations of factors (Ragin, 2009). The methodology's major purpose is to determine which combinations, configurations, or paths are adequate to achieve a minimal outcome, and which share a specified set of conditions (Ragin, 2009). We used two main parameters to measure the fit of fsQCA outcomes: consistency and coverage (Ragin, 2009), and descriptive measurements to assess the significance of a specific combination of conditions (Hsu *et al.*, 2013). Ragin (2009) defined consistency as "*the degree to which the cases sharing a given combination of conditions agree in displaying the outcome in question*" (p.44). On the other hand, the coverage score provides information about the empirical relevance of a condition. With proper values verified, the next

step was to test these values in two ways: first for necessary and then for sufficient combinations, with a minimum consistency of 0.80 and inclusion of 0.60 (Ragin, 2009).

The truth table (TT), shown in Table 4, is a key analytical tool (Verweij *et al.*, 2013). The main purpose of constructing a TT is to measure consistency and coverage through a calibrated data set and determine which conditions are sufficient or necessary for an outcome.

The TT provides the sufficiency test on Ragin's threshold at 0.80. This means that 80% of the membership scores of the cases' respondents in conjunction with conditions must be consistent. Cases with consistency values higher than 0.80 were assigned a value of 1 in the outcome for the minimization process to solve sufficient conditions. The TT recognizes the combinations that lead to scores of 0 or 1 (Ragin, 2009). The TT provides the sufficiency test, as shown in Table 4. It summarizes all the various combinations of circumstances for the outcome and categorizes those cases that fit each row of possible combinations for our Lahore-based sample OSPs. The combination of strategies provided an output with a value close to 1. This indicates that all combinations would lead to successful delivery. The sign '~' denotes the negation of a condition. In Configuration 1, the absence of two strategies was found to show sufficiency (0.886) for successful delivery in two cases. In Configurations 2 and 3, the agility strategy and (~visibility) were found to be sufficient, with a consistency score of 0.866, for successful delivery in one case, and the presence of both strategies was found to have the potential to also lead to an outcome with a score of 1.000 in six cases.

Similarly, for our Karachi-based sample OSPs, the first configuration was found to indicate that the absence of both strategies (~robustness and ~adaptation) could achieve successful delivery with a sufficiency consistency score of 0.853 in one case. Without (~robustness), the adaptation strategy was found to have a high sufficiency consistency score of 1.000, leading to an outcome in only one case in Configuration 2. In Configurations 3 and

4, the robustness strategy (~adaptation) was found to have the potential to lead to an outcome with a score of 0.853 in one case. The presence of both strategies was found to yield high sufficiency scores of 1.000 for the outcome in three cases.

The PRI scores (0.493 to 1.000) provided the sufficiency relations for the existence of the outcome. The parsimonious solution refers to the TT rows that contribute to the solution's parsimony. Logical reminders and contradictions '?&C' are substantial issues in TT analysis (Duşa, 2018). However, this study's parsimonious answer was found to be devoid of contradictions and logical reminders. As a result, we could confidently assume that all strategies were sufficient for successful delivery. The sufficiency and necessity tests were found to support all our six propositions.

A super-subset is a vital tool for the necessity test. The findings we obtained from the super-subset are shown in Table 5. Our super-subset identified six models for successful delivery (three for Lahore and three for Karachi). For Lahore, the models were found to indicate that the two strategies (Visibility and Agility) had been positively related to successful delivery. Therefore, P_1 and P_2 were found to be supported in the necessity test. One model was found to indicate that the moderation of these strategies exceeded Ragin's (2009) consistency criteria for necessary conditions, supporting P_3. Higher coverage values indicate greater empirical relevance. All models were found to imply the high relevance of the necessity (RoN) of the conditions. This indicates that a strategy or conjunction thereof is non-trivial for successful project delivery (Duşa, 2018).

[Insert Table 6 here]

[Insert Table 7 here]

Similarly, the two models for our Karachi-based sample OSPs were found to indicate that the two strategies (Robustness and Adaptation) had been positively related to successful delivery. Therefore, P_4 and P_5 were found to be supported in the necessity test. One model was found to indicate that the moderation of these strategies can lead to successful delivery, supporting P_6. Table 5 summarizes the fsQCA findings and the level of support for each proposition.

In summary, the use of fsQCA allows the systematic exploration of complex combinations of conditions, capturing both the necessary and sufficient conditions for successful project delivery in different regional contexts. The differentiation between our Karachi- and Lahore-based sample OSPs outlined above illustrates how the former had needed to maintain operational consistency amid persistent instability, whereas the latter had benefited from agility in addressing intermittent, demand-driven challenges. These distinctions highlight how resilience is not a one-size-fits-all approach, but is instead regionally contingent.

5. DISCUSSION AND CONCLUSIONS

The overarching aim of this study was to enhance our understanding of the resilience strategies adopted by OSPs participating in GVCs and operating in the Karachi and Lahore subnational regions of Pakistan. Table 8 summarizes our main findings, whereas Figure 2 provides a conceptual framework and shows how our study advances the literature.

[Insert Table 8 and Figure 2 here]

Our conceptual framework advances the extant research in six ways. First, it contributes to the resilience literature by moving away from the capability-centric views framed within the RBV and dynamic capabilities perspectives, which assume that firms possess rare and valuable resources to manage risks. As Choksy *et al.* (2017) and Sinkovics *et al.* (2019) noted, such

assumptions do not hold for disadvantaged suppliers operating in fragile environments. We advance this critique by offering a supplier agency perspective grounded in the GVC literature, in which resilience is seen as an emergent and relationally enacted practice leading to distinctive strategies (reputation-driven resilience vs. agency-driven resilience) exposed to distinctive subnational contexts. We argue that, for firms operating under conditions of ongoing violence and disruption, resilience cannot be reactive—it must be a continuous socially and temporally embedded process, constantly re-enacted in the face of adverse context. This conceptualisation is especially relevant for those suppliers facing either direct exposure to political instability violence (e.g., those based in Karachi) or indirect reputational impacts (e.g., those based in Lahore) linked to their respective subnational adverse contexts. In this way, our conceptualisation builds upon previous studies on the intersection of resilience and GVCs. For instance, Ali *et al.* (2022), who framed resilience as a dynamic capability enacted through readiness, response, and recovery stages, and Suder *et al.* (2024) who showed how non-lead firms can temporarily exercise agency during global crises. While we also recognised the importance of responses to disruption, we went further by treating resilience as an ongoing set of practices enacted to survive, rather than a discrete sequence.

Building on Choksy *et al.* (2017) and Sinkovics *et al.* (2019), we found that resilience is a requirement for disadvantaged suppliers to sustain their participation in GVCs and potentially enable upgrading. Unlike the traditional literature on upgrading in more stable emerging markets (e.g., Pasquali, 2021; Kumari *et al.*, 2024), which assumes a linear advancement supported by an institutional infrastructure, we demonstrated that, for firms in adverse contexts, upgrading is predicated upon the continuous development of resilience strategies (Darendeli *et al.*, 2021). As Choksy *et al.* (2017) argued, for such firms, upgrading cannot be understood as the straightforward functional deepening or enhancing of capabilities

in GVCs. Instead, their ability to capture value is contingent upon how they exercise their strategic agency to manage their disadvantaged position in GVCs.

Second, we advance the IB literature on GVC governance adaptation. Recent IB research has increasingly moved away from viewing GVC governance as static, recognising that governance structures are dynamic and evolve in response to both firm-level agency and contextual volatility (Verbeke *et al.*, 2021; Kano *et al.*, 2022). We found that any direct exposure to political instability and violence will encourage adaptive forms of modular governance. Furthermore, intermittent exposure to political instability and violence facilitates a more cooperative relationship between GVC buyers and suppliers through relational governance, but involves elements of captive governance through intense monitoring (Ponte and Sturgeon, 2014). Drawing from Islam and Chadee (2024) and Kano *et al.* (2022), who both argued for more flexible governance approaches under crisis conditions, we went further, showing that governance and resilience are co-constitutive for disadvantaged suppliers (Choksy *et al.*, 2024)—i.e., that suppliers do not passively absorb governance pressures; they actively reshape governance relationships in context-specific ways to create space for resilience. For example, our Karachi-based sample OSPs adapted modular governance through flexible and iterative codification to achieve robustness, while their Lahore-based counterparts navigated hybrid relational-captive governance dynamics to manage reputational risks. In doing so, we contribute to the evolving understanding of governance as a dynamic process—as opposed to a mere high-level coordination mechanism imposed by lead firms. Such a perspective complements the broader GVC governance literature by illuminating the micro-foundations of supplier survival strategies under conditions of uncertainty.

Third, answering the calls made by Beugelsdijk and Mudambi (2013) and Hutzschenreuter *et al.* (2020), our conceptual framework departs from those national-level results to provide a more fine-grained contextual perspective that considers the subnational

variations found in suppliers' exposure to adverse contexts and their differential resilience strategies. The direct or indirect firm-level impact shapes the GVC governance structures and, in turn, resilience strategies. Our Karachi-based sample OSPs operated under conditions of persistent exposure to political instability and violence, while their Lahore-based counterparts faced intermittent instability that impacted them indirectly through global buyer perceptions. Particularly, expanding on Shamim *et al.* (2020), Sinkovics *et al.* (2019), and Oliveira *et al.* (2021), we demonstrated how the adoption of technology in resilience strategies is shaped by subnational variations. Our Karachi-based sample OSPs prioritised local technological stability to maintain internal operations and address process disruptions. This was because technology serves as a stabilizing tool within modular governance frameworks, reflecting a survival-driven approach. Conversely, our Lahore-based sample OSPs emphasized global technological connectivity to align themselves with their international clients' demands and build visibility. The adoption of technology focusses on transparency and collaboration, in line with both captive and relational governance structures. These findings show that the adoption of technology is not uniform but is mediated by governance structures and subnational conditions. The integration of technology into resilience strategies demonstrates its dual role as a tool for stability and connectivity, contributing to the broader discourse on digital transformation in GVCs. These variations produce differentiated resilience repertoires, reinforcing the importance of theorising resilience not at the national level, but through spatially uneven environments. We thereby extended the spatial turn in the IB literature by showing how place-specific adversity—not just country-level risk—conditions how resilience is enacted at the firm level.

Fourth, recent scholarship, such as Brouthers *et al.* (2022), has highlighted the growing relevance of virtual entry modes in internationalization; yet, it also acknowledges the nuanced ways in which firms make their entry choices in relation to their virtual presence across

countries. We built on this perspective by demonstrating that, even within the software industry, the required degree of interaction and resilience can differ significantly by project type (i.e., CSD vs. EEP). While virtualization is an important and growing trend, we showed that subnational adversity shapes both the feasibility and credibility of virtual entry modes. This underscores the need to disaggregate digital sectors and to recognize that resilience is influenced not only by industry type but also by the nature of the work and context-specific vulnerabilities.

Fifth, we explored the inter-dependency between a) OSP exposure to adverse contexts and b) GVC governance structures. Previous research had focused on the connections between GVCs and regional development (Coe *et al.*, 2008; Humphrey and Schmitz, 2002). We advanced this agenda by showing why specific suppliers embedded in certain locations and exposed to different GVC governance linkages adopt distinct resilience strategies. Although our study's focus was on Pakistan, its findings are applicable to other countries exhibiting subnational variations. The contribution of our research lies not only in identifying any subnational regional variations, but in examining how these interact with the dynamics of GVC governance. In many emerging and developing countries—such as India, Nigeria, and Brazil—there are notable differences across subnational regions, with some areas functionally exhibiting the characteristics of emerging markets, and others facing conditions more comparable to fragile or adverse environments. Rather than solely as a product of local institutional conditions, resilience must be understood as emerging from the evolving interplay between subnational environments and the governance structures of global value chains (GVCs). We provide a framework suited to the examination of these cross-scale connections and encourage future research to embrace the depth and complexity of these interactions when assessing supplier resilience and prospects for upgrading across national boundaries. This interaction becomes particularly relevant in view of the current geopolitical shifts—such as the

US-China trade tensions, rising protectionism, and escalating tariffs—that have direct and indirect consequences for developing and emerging economies. For instance, the recent US tariffs, which affect not only China but also countries like Pakistan and India, are reshaping the structure and costs for local suppliers of participating in GVCs.

The framework presented in our study illustrates how suppliers operating in politically unstable subnational regions need to navigate both domestic institutional volatility and any external global shocks. In doing so, it offers a broader lens for understanding how firms in similarly adverse contexts adjust to, and potentially reconfigure, their roles within GVCs amid ongoing global realignments. Resilience, then, is not merely a firm-level response to discrete disruptions, but an embedded, evolving practice formed at the intersection of local instability and global structural change.

Finally, our use of fsQCA in this study was particularly relevant as it enabled us to identify complexity and configuration-specific insights that would have been challenging to capture with traditional methods. fsQCA provided a clear view of how combinations of strategies (visibility-agility in Lahore and robustness-adaptation in Karachi) helped achieve successful outcomes by enabling a nuanced exploration of how resilience strategies differ based on subnational contexts. The parsimonious solutions derived from fsQCA indicate the sufficiency of strategy combinations without logical contradictions, reinforcing the robustness of the findings. This approach also helps to avoid logical inconsistencies, ensuring that the identified configurations reliably lead to successful delivery outcomes. Accordingly, we introduced a novel application of fsQCA to capture the spatial heterogeneity within adverse contexts, revealing that subnational distinctions in instability necessitate different resilience strategies. This contributes to the IB literature by showing that GVC suppliers are not uniformly impacted by adverse contexts; rather, their resilience strategies reflect local conditions, which, in turn, shape their ability to meet GVC demands.

5.1. Managerial implications

Our findings have important implications for those developed country lead firms or MNEs that engage with suppliers based in politically diverse and unstable subnational environments. First, lead firms need to understand and assess the specific subnational regions of suppliers before deciding on the specific governance structure to adopt to manage GVCs. Labelling a country based on news narratives or national reputation may provide distorted views and may not capture the spatial heterogeneity within the country. For subnational regions exposed to high levels of violence and political instability (like that of Karachi), lead firms should align their strategies with the modular governance structure prevalent in this region. This involves clearly defining and codifying project specifications that can be delivered with minimal in-person coordination, thereby mitigating the risks associated with high levels of political instability and violence. Conversely, lead firms can invest in more relational governance linkages with suppliers based in subnational regions characterised by periodic exposure to political instability and in possession of a high capability to co-create software products.

Our findings also have implications relevant to suppliers that are part of GVCs. These OSPs can adopt robust working patterns and set up telecommuting arrangements suited to ensure project continuity and mitigate any process disruption. These could include investments in cloud-sharing technologies, backup internet, and other infrastructure suited to support remote work. Ensuring employee safety is paramount; therefore, reliable communication channels and work schedules can help keep employees engaged and productive even during crises. Furthermore, suppliers can invest in digital platforms to enhance transparency and real-time tracking of project progress for their international clients. Regular updates and the proactive management of client interactions can help build trust and confidence, mitigating the impact of potential demand-side disruptions. Emphasizing agility to accommodate changing

client requirements and demonstrating a broad scope of service capabilities can position suppliers as reliable partners capable of handling complex, evolving project demands.

Finally, with the increasing decoupling of value chain activities between developed economies and EMs in the form of reshoring and nearshoring, we argue that exploring GVC suppliers' resilience in adverse contexts and its link to GVC governance explains why MNEs often fail to manage their GVCs. Such failures originate from the MNEs' lack of understanding of their suppliers' resilience strategies and adverse contexts. The MNEs' governance strategies, especially with an increase in GVC disruptions, must incorporate the suppliers' contexts and their agencies. In this regard, it is important for MNEs' governance to consider the subnational differences of their suppliers, as these very differences can elicit the adoption of governance strategies and supplier resilience strategies that may very well facilitate/hinder MNEs' ability to keep their GVCs resilient (Ambulkar *et al.*, 2015; Chowdhury and Quaddus, 2016).

5.2. Policy implications

Our findings and our conceptual framework provide important implications for policymakers to support local firms in building resilience strategies when exposed to different levels of subnational adverse contexts and GVCs. For example, in those subnational regions in which exposure to violence and political instability is continuous, policymakers need to support the continued smooth operation of local firms by providing support for infrastructure and for any mental health issues resulting from trauma linked to violent conflict, and other such mechanisms. Our supplier agency perspective on resilience shows the importance of how firms cope and behave when faced with specific forms of disruptions. However, as we drew our evidence from a limited number of successful cases, it should be noted that not all firms can demonstrate positive behaviours in response to disruptions. To disseminate such resilient behaviours, policymakers can work with local firms in designing policies whereby firms can learn to build robustness, adaptiveness, visibility, and agility.

5.3. Limitations and future research directions

Although our study has revealed important insights, it does have limitations that can provide important avenues for future research. First, its focus was limited to Pakistan's software industry; future studies could thus strive to understand subnational variation in suppliers' resilience in different extreme contexts in which exposure to adverse contexts may vary across subnational contexts. Future studies could also compare other sectors and examine how local firms and MNE subsidiaries develop resilience in similar markets. Second, it leveraged qualitative data drawn from selected successful suppliers from two different locations with varying degrees of uncertainty. Thus, future studies could conduct large-scale surveys aimed at examining how different resilience strategies—e.g., linked to entrepreneurial, psychological, network, and employee resilience—contribute to the performance of local suppliers and how instances of successful resilience may differ from failures. Future research could also explore the sources of resilience found in countries that exhibit multiple sweeping disruptive forces at once. Such studies could perform multilevel analyses of disruptions and of the associated resilience strategies enacted by different firms embedded in multiple institutional environments.

Our study was focussed on OSPs embedded in GVCs and did not examine how resilience strategies may differ for firms operating in domestic value chains. Future research could compare suppliers in both domestic and global value chains to examine how variations in governance structures, client relationships, and institutional pressures influence resilience practices across different contexts.

While our study offers insights into service-based GVCs, its focus on software firms limits the generalizability of its findings to the broader digital economy. Future research could examine whether similar resilience dynamics apply in other digital industries with different degrees of virtualization and global embeddedness. In this context, future studies could explore

the degree of embeddedness needed for local suppliers to successfully integrate into GVCs through unconventional entry modes (cf. Brouthers *et al.*, 2022). Specifically, important insights could be obtained through by investigating how local suppliers based in emerging markets leverage virtual operations and nurture relational ties to engage in the GVCs—and how this embeddedness shapes their ability to capture value within GVCs.

While we acknowledged the existence of intra-city variation, our analysis was focussed on city-level contexts, with firm-level resilience strategies interpreted accordingly. Future research could build on this by examining how intra-city dynamics further shape firms' exposure to adversity and their strategic responses.

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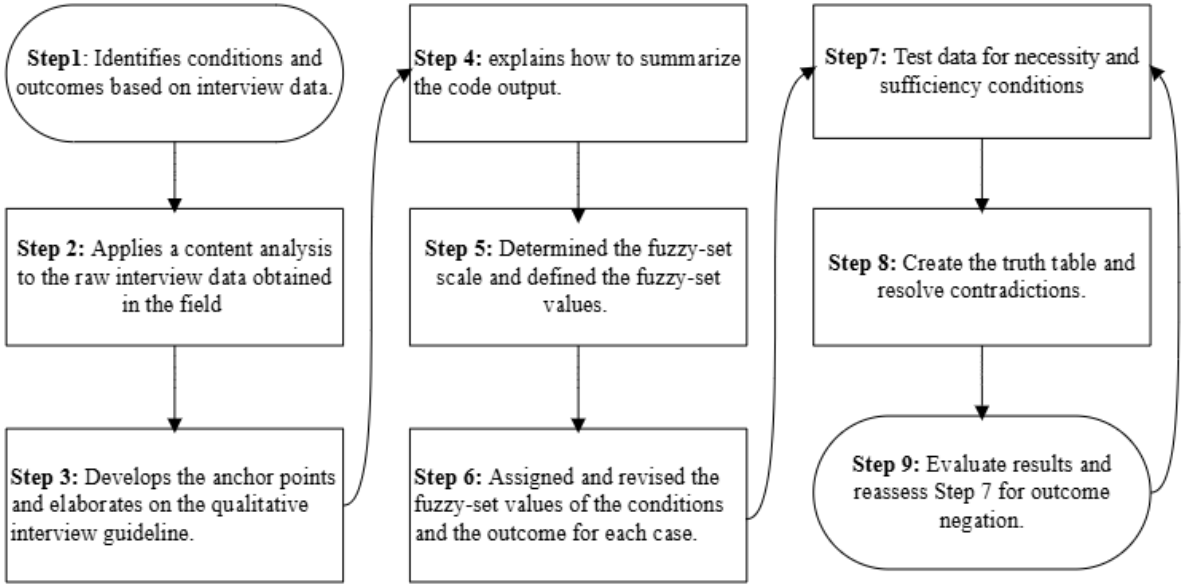


Figure 1: fsQCA Process

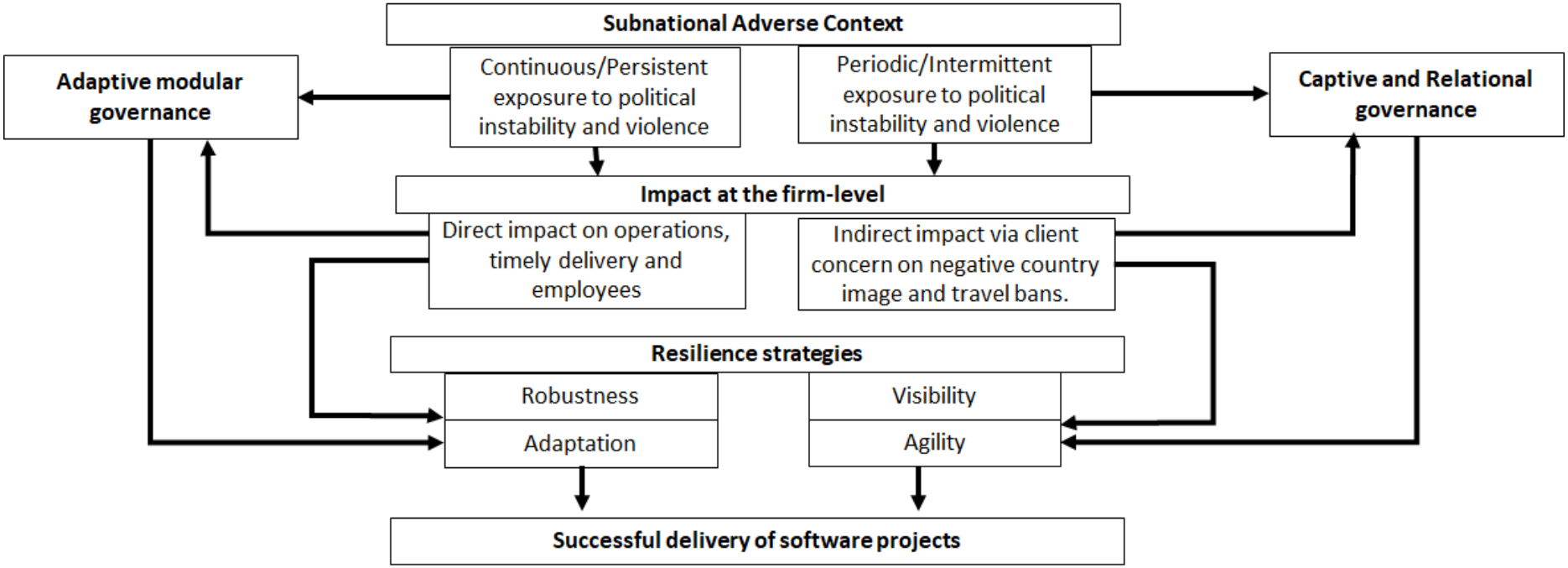


Figure 2: Conceptual framework

Table 1: Adverse Contexts and Emerging Market Contexts

Aspect	Adverse Contexts	Emerging Market Contexts
Institutional Strength	Highly fragmented or absent	Weak but improving
Nature of Challenges	Severe political, social, and economic instability	Institutional voids but with access to mitigating resources
Role in GVCs	Marginalized or struggling to sustain participation	Increasingly integrated with a focus on upgrading

Table 2: Description of the companies

OSP	Head office	Overseas office	Clients' Region	Business formation	No. of employees
OSP#A	Karachi	US	US	2005	200+
OSP#B	Lahore	Saudi Arabia	US and Saudi Arabia	2011	30
OSP#C	Karachi	UK	UK and Europe	2007	30
OSP#D	Karachi	UK	UK and Europe	2009	30–50
OSP#E	Karachi	None	Europe	2007	300+
OSP#F	Lahore	US	US and Europe	2005	200+
OSP#G	Lahore	US	US and Europe	2006	150+
OSP#H	Lahore	US	US	2009	100+
OSP#I	Karachi	None	Europe	2011	10–20
OSP#J	Lahore	None	Europe	2009	20–30
OSP#K	Lahore	Singapore	Singapore and US	2010	30–50
OSP#L	Lahore	US	US	2009	200+
OSP#M	Lahore	US	US	2007	30–50
OSP#N	Karachi	Malaysia	Europe and Malaysia	2007	50+
OSP#O	Karachi	Netherlands	Europe	2011	20+
OSP#P	Karachi	None	Europe	2009	20+
OSP#Q	Lahore	US	US and Europe	2007	50

Table 2: Difference between EEP and CSD projects

Types of projects	Value-chain functions	Value-chain tasks	Codifiability	Need for Explicit Coordination	Nature of tasks and learning from GVCs or other sources
End-to-End Product Development	Business requirement gathering and software design	Product ideas Requirement analysis High-level design	Low Low Medium	High High High	- Assessment of user experience and user needs (Source: knowledge of users from international clients, OSP internal research, OSP hiring experts on project basis, mutual knowledge exchange between international clients and OSPs). - Assessment of client's business and industry domain (Source: directly from international clients) - Software architecture knowledge and designing the software app (Source: OSP internal training, OSP hiring experts, feedback, and knowledge exchange from international clients). - Ensuring UX knowledge is embedded in technical design document (mutual knowledge exchange between international clients and OSPs).
Custom Software Development	Technical specification design	Low-level design	Medium to High	High	- Translating the software design specification for software development tasks (Source: Mutual knowledge exchange with international clients, internal expertise in software engineering)
	Software development implementation	Programming and Coding Testing	High High	Low Low	- Executing the software requirements (Source: Internal) - Quality assurance of the software (Source: Internal)

Table 4: Subnational contextual variations for Pakistani suppliers

Suppliers	Exposure to adverse contexts across the subnational environment and its impact on suppliers	Differences in GVC governance	Impact at the Firm-level
Karachi Suppliers	**Exposure**: Continuous and persistent exposure to political instability and violence, including city-wide political strikes, clashes between political parties leading to violence in the city, bombings -including suicide bombings- in the city, terrorist attacks, and targeted killings.	**Adaptive Modular GVCs:** characterized by low power asymmetry between clients and suppliers and some explicit coordination via iterative structured codification during low-level design tasks	Direct Impact: Lack of employee motivation, employee coordination for the projects, office closures, employees leaving
Lahore Suppliers	**Exposure:** Intermittent and episodic in some areas of Lahore more than others	**Dynamics between Relational and Captive GVCs:** characterized by low to medium power asymmetry, frequent coordination, and higher interdependency between suppliers and clients.	**Indirect Impact:** client's negative perception of country image, unwillingness to travel, demanding more transparency, demanding small notice changes

Table 5: Subnational variations in resilience strategies

Karachi suppliers' resilience strategies			*Lahore suppliers' resilience strategies*		
First order categories	**Second order themes and concepts**	**Aggregate dimensions**	**Aggregated dimensions**	**Second order themes and concepts**	**First order categories**
- Investing and installing backup generators. - Developing infrastructure for telecommuting. - Training best telecommuting practices.	Telecommuting	Adaptation using digital tools	Visibility using digital tools	Traceability	- Providing clients with digital tools to have 24/7 real-time visibility into clients - Providing team contacts to reach 24/7 to address time zone differences. - Providing daily and weekly updates to clients about project progress.
- Document management systems. - Cloud sharing in real-time among employees	Cloud computing coordination			Transparency	- Providing clients with direct transparency of the project team's details. - Transparent procedures and visibility into how the software development process will be done.
- Working overtime without charging extra money from the client. - Compensating employees for overwork time - Backup employees if existing ones are unable to work.	Robust working pattern	Robustness	Agility	Client agility	- Adopting changes in requirements at a short-term level - Adopting changes in required resources and time at a short-term level.
- Perseverance to client exit news. - Maintaining continuity despite disruptions. - Not coming under client pressure.	Robust organizational values				

Table 6: Truth table for Lahore suppliers and Karachi suppliers

Lahore						
No	Visibility	Agility	Out	N	Incl.	PRI
1	0	0	1	2	0.886	0.500
2	0	1	1	1	0.866	0.493
3	1	1	1	6	1.000	1.000
Karachi						
No	Robustness	Adaptation	Out	N	Incl.	PRI
1	0	0	1	1	0.853	0.493
2	0	1	1	1	1.000	1.000
3	1	0	1	1	0.853	0.493
4	1	1	1	3	1.000	1.000

No=number of configurations; 1=presence and 0=absent; Out=output value (1=successful delivery and 0=non-successful delivery); n=number of cases in configuration; Incl.=sufficiency inclusion score; PRI=proportional reduction in inconsistency.

Table 7: fsQCA, models, and results

Necessity results and models	**Incl.**	**RoN**	**CovN**	**Support**
Lahore				
VISIBILITY -demand side expectations	0.889	1.000	1.000	P_1 is supported
AGILITY	0.889	0.907	0.940	P_2 is supported
VISIBILITY* AGILITY	0.834	1.000	1.000	P_3 is supported
Karachi				
ROBUSTNESS	0.817	0.887	0.898	P_4 is supported
ADAPTATION	0.910	1.000	1.000	P_5 is supported
ROBUSTNESS * ADAPTATION	0.817	1.000	1.000	P_6 is supported

Note: Key: UPPER CASE shows the presence of the variable; the "*" sign means the combination of variables or variables moderation.

Table 8: Summary of the findings

Feature	Karachi-Based OSPs	Lahore-Based OSPs
Dominant Resilience Strategy	Agency-Driven Resilience: Proactive shaping of responses; leveraging internal capabilities.	Reputation-Driven Resilience: Proactive trust-building; managing external perceptions.
Role of Local and Global Context	Balancing emphasis on a) local resource utilization and workforce empowerment and b) international client's iterative codification.	Responding mainly to negative country image and distance challenges via captive GVC linkages; emphasis on building trust and addressing reputational risks.
Key Practices	Overtime work with employee engagement, proactive communication, telecommuting, cloud-sharing, and flexible project management.	Transparency of skills and processes; real-time project visibility; agility in meeting client demands; proactive reputation management; extensive communication.
Role of Technology	Technology used to overcome local adverse context and enhance internal efficiency.	Technology used to enhance communication, transparency, project visibility, and build trust.
GVC Governance	Tendencies toward adaptive modular governance primarily driven through pre-defined and iterative codification; relatively balanced power dynamics; strong internal agency in navigating GVC relationships.	Predominantly relational governance; imbalanced power dynamics favouring buyers; strong emphasis on building and maintaining client relationships to address reputational challenges.
	Relatively low client monitoring; empowered negotiation; flexible work patterns; autonomy; Modular Governance tendencies.	High client monitoring resembling captive linkages emphasis on transparency and communication; imbalanced power dynamics
	A more balanced power dynamic with clients, greater agency in managing projects, and supplier empowerment.	Less autonomy; greater emphasis on client satisfaction and proactive communication; Buyer-driven power dynamics.