

**OPEN INNOVATION PERFORMANCE OF
PAKISTANI SMES: THE ROLES OF
INTELLECTUAL CAPITAL, ABSORPTIVE
CAPACITY, ORGANIZATIONAL AGILITY, AND
ORGANIZATIONAL INERTIA**

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ORGANIZATIONAL INERTIA**

by

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LIST OF ABBREVIATIONS

IC	Intellectual Capital
HC	Human Capital
RC	Relational Capital
SC	Structural Capital
AC	Absorptive Capacity
OA	Organizational Agility
OI	Organizational Inertia
OIP	Open Innovation Performance
SMEs	Small and Medium Enterprises
AVE	Average Variance Extracted
CB-SEM	Covariance-based SEM
CMB	Common Method Bias
CR	Composite Reliability
HTMT	Heterotrait-Monotrait Ratio
PLS-SEM	Partial Least Squares Structural Equation Modelling
SEM	Structural Equation Modelling
SPSS	Statistical Package for Social Sciences
SRMR	Standardized Root Mean Square Residual
VIF	Variance Inflation Factor
USM	Universiti Sains Malaysia

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- Appendix A Questionnaire
- Appendix B Outer Model Descriptive

**PRESTASI INOVASI TERBUKA PERNIAGAAN KECIL DAN
SEDERHANA (PKS) PAKISTAN: PERANAN MODAL INTELEKTUAL,
KAPASITI PENYERAP, KELINCAHAN ORGANISASI, DAN INERTIA
ORGANISASI**

ABSTRAK

PKS memainkan peranan penting dalam industri pembuatan Pakistan, tetapi prestasi mereka terjejas kerana tahap inovasi yang rendah. Pakar industri menyokong prestasi Inovasi Terbuka, yang merupakan topik yang agak baharu dalam bidang perniagaan; namun, kesedarannya semakin meningkat setiap hari. Inovasi Terbuka ialah elemen utama kerana organisasi dalam sektor pembuatan mendapat kelebihan daya saing berbanding syarikat lain. Baru-baru ini, PKS Pakistan telah mengalami prestasi inovasi terbuka yang rendah. PKS ini masih bergelut untuk mencapai kejayaan dalam penerimaan inovasi terbuka. Penurunan dalam amalan inovasi terbuka menjejaskan prestasi keseluruhan PKS. Untuk menangani isu ini kajian semasa menggunakan pendekatan penyelidikan kuantitatif dan reka bentuk penyelidikan keratan rentas. Untuk mengeksploitasi sepenuhnya faedah berkaitan sektor pembuatan, adalah penting untuk mengenal pasti faktor yang menyumbang kepada prestasi inovasi terbuka. Untuk berbuat demikian, kajian ini telah membangunkan rangka kerja teori dengan mengintegrasikan komponen modal intelek iaitu modal insan, modal struktur dan modal hubungan, kapasiti penyerapan, ketangkasan organisasi, inersia organisasi, dan prestasi inovasi terbuka berdasarkan pandangan berasaskan sumber, teori keupayaan dinamik, dan teori ekologi organisasi. Model ini dinilai menggunakan (PLS-SEM) dengan sampel 395 PKS pembuatan di Punjab Pakistan. Skala Likert tujuh mata digunakan untuk menilai pembolehubah kajian.

Berikut adalah penemuan utama kajian semasa. Pertama, komponen modal intelek (modal insan, modal struktur dan modal perhubungan), memberi kesan positif kepada kapasiti penyerapan dan ketangkasan organisasi. Kedua, kapasiti penyerapan dan ketangkasan organisasi menyumbang secara positif kepada prestasi inovasi terbuka. Ketiga, kapasiti penyerapan dan ketangkasan organisasi memainkan peranannya sebagai pengantara selari untuk hubungan modal insan, modal struktur dan modal hubungan dengan prestasi inovasi terbuka. Keempat, inersia organisasi bertindak sebagai peranan penyederhana untuk hubungan kapasiti penyerapan dan ketangkasan organisasi, manakala ia adalah signifikan dengan kapasiti penyerapan dan tidak signifikan dengan ketangkasan organisasi. Oleh itu, adalah disyorkan bahawa PKS pembuatan Pakistan menyepadukan kapasiti penyerapan ke dalam amalan inovasi terbuka mereka. Selain itu, modal intelek yang kukuh meningkatkan prestasi inovasi terbuka mereka. Oleh itu, penyelidikan telah menyerlahkan keputusan ini dan cuba mewajarkannya secara logik. Tambahan pula, ia menawarkan beberapa implikasi teori dan praktikal, mencadangkan arah yang berpotensi untuk penyelidikan masa depan. Oleh itu, kajian semasa memberi manfaat kepada PKS untuk meningkatkan prestasi keseluruhan dengan mempercepatkan sistem inovasi terbuka. Implikasi teori dan praktikal kajian ini dibentangkan dan dibincangkan pada akhir.

**OPEN INNOVATION PERFORMANCE OF PAKISTANI SMES: THE
ROLES OF INTELLECTUAL CAPITAL, ABSORPTIVE CAPACITY,
ORGANIZATIONAL AGILITY, AND ORGANIZATIONAL INERTIA**

ABSTRACT

SMEs play a significant role in Pakistan's manufacturing industry, but their performance is suffering due to low levels of innovation. Industry experts advocate Open Innovation performance, which is a relatively new topic in the business field; however, its awareness is growing with each passing day. Open Innovation is the key element that enables organizations in the manufacturing sector to get a competitive edge over other companies. Recently, Pakistani SMEs have suffered from low open innovation performance. These SMEs are still struggling to achieve success in open innovation adoption. Decline in open innovation practices hampered the overall performance of SMEs. To address this issue, the current study adopted a quantitative research approach and a cross-sectional research design. To fully exploit the associated benefits of the manufacturing sector, it is important to identify the factors that contribute to open innovation performance. For doing so, this study has developed a theoretical framework by integrating components of intellectual capital, i.e., human capital, structural capital, relational capital, absorptive capacity, organizational agility, organizational inertia, and open innovation performance based on resource-based view, dynamic capability theory, and organizational ecology theory. The model was assessed using PLS-SEM with a sample of 395 manufacturing SMEs in Punjab, Pakistan. A seven-point Likert scale was used to assess the research variables. The following are the key findings of the current study. Firstly, intellectual capital components (human capital, structural capital, and relational capital), positively

impact absorptive capacity and organizational agility. Secondly, absorptive capacity and organizational agility positively contribute to open innovation performance. Thirdly, absorptive capacity and organizational agility play their role as a parallel mediator for the relationship of human capital, structural capital, and relational capital with open innovation performance. Fourthly, organizational inertia acts as a moderating role for the relation of absorptive capacity and organizational agility, whereas it was significant with absorptive capacity and not significant with organizational agility. Hence, it has been recommended that Pakistani manufacturing SMEs integrate absorptive capacity into their open innovation practices. Moreover, strong intellectual capital enhances their open innovation performance. Thus, the research has highlighted these results and tried to justify them logically. Furthermore, it offers some theoretical and practical implications, suggesting potential directions for future research. Therefore, the current study is beneficial for SMEs to boost the overall performance by accelerating the open innovation system. The theoretical and practical implications of this study are presented and discussed at the end.

CHAPTER 1

INTRODUCTION

1.1 Introduction

According to the literature, the innovation trend has shifted; organizations are now working differently on commercialization and conceptualization, resulting in organizations functioning without borders (Farhan, 2019). Many entities, including suppliers, customers, agents, dealers, research firms, and competitors, are examined to be involved in various innovative techniques (Obradović et al., 2021).

According to Bano et al. (2024) Product, service, and process innovation is highly beneficial in terms of deploying local resources and improving SMEs' performance. According to Gherghina et al., (2020) all sorts of innovations have a favourable impact on the organization's operations and finances. Conversely, a lack of innovation leads to poor performance. Furthermore, it is suggested that employee creativity drives innovation, with all sorts of innovation beginning with creative thinking and ideas (C. Lee, 2023).

In the twenty-first century, a new paradigm for conceiving, sponsoring, and performing has replaced scientific and technical research. In the traditional model of closed innovation, research and development activities are carried out tightly in a firm's laboratory, and the innovation process is executed in isolation (Moya et al., 2024). The term innovation is now used in a new context, i.e., Open innovation (OI). Researchers are becoming increasingly interested in the concept of Open Innovation (OI). The traditional model of innovation is being replaced by a new model of Open Innovation, which links markets and technologies to enable firms to evolve new

configurations (Sá et al., 2023). Innovation in an organization is always likely to increase with creativity, making it more productive and competitive.

The open innovation approach is the only way by which organizations can attain sustainable development. The OI theory identifies the various categories of partners involved in the innovation process, their respective roles, and the reciprocal advantages they can contribute (Bigliardi et al., 2022). Open Innovation is a controversial subject, and some authors argue that it is simply "old wine in new bottles" (Hameed et al., 2021). While others argue that corporations should expand their horizons and use both internal and external technologies (Oduro, 2019). Henry Chesbrough developed the concept of open innovation in 2003. Open Innovation uses both internal and external ideas to create value. It was also anticipated that external channels may be used by internal ideas to provide further value (Chesbrough, 2003). With the ongoing advancement of science and technology, open innovation methods and many studies indicate that it can produce greater returns than we had anticipated (Chesbrough & Brunswicker, 2014). The success of Open Innovation demonstrates the value of both internal and external knowledge sources (Yu, 2013). Open innovation activities are a major concern in emerging markets. In the age of the knowledge economy, open innovation supports the investigation of progress and has a direct impact on the competitiveness of businesses (Tena & Marina, 2021). Open innovation is a productive method for businesses to manage both internal and external resources (Bigliardi et al., 2022). Open innovation is projected to be one of the emerging future paradigms for managing business in globalized and dynamic corporate environments (Gebremichael, 2018). Open innovation can be seen as a key factor in businesses' improved performance and economic growth as well as nations' prosperity (Puriwat & Tripopsakul, 2021). Open Innovation performance (OIP) has long been a subject of

attention in modern business fields due to its link to economic growth (Kim et al., 2021). The main objective of open innovation is to open the innovation process to other companies, individuals, research labs, universities, customers, suppliers, and so forth to facilitate the free exchange of ideas both inside and outside the organization (Chesbrough, 2006).

According to research, this new approach is primarily used by large organizations, and early studies concentrated on open innovation processes in large enterprises. According to Barrett et al. (2021), open innovation is equally essential for SMEs to enhance their innovative performance. Hassan & Iqbal (2020) stated that Research on open innovation in SMEs is highly significant due to the essential role that SMEs play in the economy, which constitute 90% businesses and more than 50% of employment worldwide, as well as up to 40% of national revenue (GDP) in emerging economies such as Pakistan (Arshad, 2020).

Some scholars suggest that SMEs can profit more from open innovation than larger organizations due to lower bureaucracy, better risk-taking, and faster adaptation to changing circumstances (Hossain, 2015). Bigliardi et al. (2022) stated that while the acceptance of open innovation is very important. However, SMEs tend to adopt open innovation to a small extent compared to large corporations. This is primarily due to internal and external limitations related to resources, scale, skills, capacity, as well as a lack of understanding and access to external knowledge and expertise in intellectual asset management (Wu et al., 2021). According to an OECD survey, approximately 5-20% of SMEs in developing countries actively use the open innovation method. Ultimately, there is the rise of an important question: "How can manufacturing SMEs in developing countries like Pakistan enhance their open innovation Performance?"

Manufacturing SMEs can enhance their open innovation performance by changing their focus from material to immaterial assets to find new solutions for their business's survival and development. Investment in intangible resources and capabilities promotes employee productivity and improves the organization's chances of demonstrating improved efficiency in both the local and global markets.

Undoubtedly, Intellectual Capital is an important intangible resource that enables organizations to gain a lasting competitive advantage (Danish et al., 2021). Research has shown that 20% of an organization's success is attributed to tangible assets, while the remaining 80% is attributed to intangible assets (Carson et al., 2004). Therefore, the success of the organization is heavily reliant on its intellectual capital. The firm's IC can be leveraged to achieve a higher level of innovation performance for SMEs (Ajeeli et al., 2018). Furthermore, there is widespread agreement that IC encompasses three major dimensions: Human capital,

Structural capital and Relational capital (Brontis, 1998). Hence, IC is considered an important asset in facing the challenges brought about by open innovation performance in SMEs.

In today's complicated and fast-paced business climate, intensive innovation can help a company survive and achieve long-term success (Prakasa et al., 2022). Firms are increasingly seeking internal and external expertise to speed up the open innovation process (H. Chesbrough & Crowther, 2006; Kousar et al., 2019). The utilization of internal and external knowledge for innovation is dependent on the organization's Absorptive capacity (Lane & Pathak, 2006; Bergh & Lim, 2008; Lu et al., 2023). Absorptive capacity is defined in the literature as a firm's "ability to recognize the value of new information, assimilate it, and apply it to commercial

ends"(Cohen, Levinthal, 1990). It enhances firms' competencies and innovation performance. Absorptive capacity is a complex notion, with research identifying four dimensions as "acquisition, assimilation, transformation, and exploitation" of information (Zahra & George, 2002). Absorptive capacity is important for organizational innovation because it improves the firm's ability to perceive and apply external knowledge for commercial purposes (Cohen, Levinthal, 1990). Similarly, Zahra & George (2002) suggested that Absorptive capacity is critical to system improvement and organizational innovation. An empirical study reveals that Absorptive capacity improves a firm's innovative activities (Kousar et al., 2019). In line with these arguments, Absorptive capacity is viewed as a vital resource to enhance open innovation performance (OIP).

Due to the ever-changing market situation, modern firms must embrace agility. Flexibility has become critical to success and growth (Khusna, 2021). Research indicates that Organizational agility greatly improves business performance and competitive advantage (Dahms, 2023). Organizational agility fosters an environment that is favourable for the flourishing of innovation. Organizations can effectively incorporate innovative ideas, processes, and technology by demonstrating flexibility and adaptability. According to Mughal & Ali (2023), an organization's potential for innovation is improved by its ability to promptly adapt to changes and explore new methods. Slimene et al. (2022) found that implementing Organizational agility strategies leads to improved innovation performance. Conversely, Chaudhary & Trzecieli (2019) argue that agility is a result or measure of performance. Therefore, it is believed that Organizational agility is viewed as an important capability to strengthen open innovation performance in SMEs.

SMEs are struggling to develop an effective open innovation framework that can improve performance. However, Organizational inertia exists, which is one of the major determinants preventing SMEs from adopting open innovation (Moradi et al., 2021). Organizational inertia is when an organization doesn't want to try new things or change the way it does things (Moradi et al., 2021). The challenge can be particularly tough to solve in businesses with long-standing traditions and set ways of doing things (Ardyan et al., 2022). According to studies, organizational inertia is not beneficial for organizations involved in innovative activities because it has a detrimental impact on innovation performance (J. Huang et al., 2020).

Within the framework of open innovation in manufacturing (SMEs), this study endeavours to comprehensively explore both the opportunities and threats that emerge. The principal objective of this research is to investigate how manufacturing SMEs in Pakistan can bolster their Open innovation performance through the strategic utilization of Intellectual Capital, encompassing Human Capital, Structural Capital, and Relational Capital components. The study also seeks to assess the mediating impact of Absorptive Capacity and Organizational Agility in shaping the relationship between Intellectual Capital and open innovation performance. Moreover, the investigation aims to scrutinize the potential moderating role of organizational inertia in influencing the dynamics among absorptive capacity, organizational agility, and open innovation Performance. This inquiry into the interplay of these variables aims to shed light on whether organizational inertia acts as a catalyst for performance enhancement or, conversely, as a factor that impedes progress.

1.2 Research Background

1.2.1 The importance of the Manufacturing sector (SMEs) in Pakistan

Although small manufacturing SMEs contribute less to the economy than large manufacturing sectors, they are the backbone of Pakistan's industrial landscape. These small enterprises play a vital role in generating employment, alleviating poverty, and fostering regional development. Their flexibility, adaptability, and entrepreneurial spirit make them an essential driver of innovation and economic resilience (Khan et al., 2023).

This study focuses on small manufacturing SMEs because they face unique challenges in managing resources, embracing innovation, and responding to market changes. These factors are crucial for understanding and improving their performance in open innovation. Given their significant contributions to job creation and local economies, strengthening this sector can greatly impact national economic growth and competitiveness.

As of the fiscal year 2023–2024, small and medium enterprises (SMEs) in Pakistan's manufacturing sector play a significant role in the national economy. According to the Economic Survey for 2023–2024, small-scale manufacturing accounts for 19.5% of the overall manufacturing sector and contributes approximately 2.3% to the country's GDP (Zaryab Kubra Naqvi, 2023). SMEs in Pakistan play a crucial role in economic activity, accounting for approximately 90% of all businesses and employing over 80% of the non-agricultural workforce. They contribute around 40% to the GDP and are responsible for 25-30% of the country's exports (Shah, 2023). Manufacturing small and medium-sized enterprises (SMEs) play a crucial role in the economy, but they face significant challenges, particularly limited access to financing.

Currently, these SMEs receive just 5.3% of the total lending from the banking sector to the manufacturing industry. To address this issue, efforts are being made to enhance their integration into formal value chains and improve their access to credit, with the goal of boosting their productivity and export potential (Ganne et al., 2022).

Pakistan's manufacturing sector is divided into three sub-sectors: large-scale, small-scale, and slaughterhouse. The slaughtering industry is classified as manufacturing, whereas livestock is classified as agricultural (Naveed et al., 2022). Large-scale manufacturing accounts for 80% of total manufacturing and 10.8% of GDP. Small-scale manufacturing accounts for 13.8% of total manufacturing output and 1.9% of GDP. Slaughtering accounts for 6.5% of total manufacturing output and 0.9% of GDP. (More, 2021).

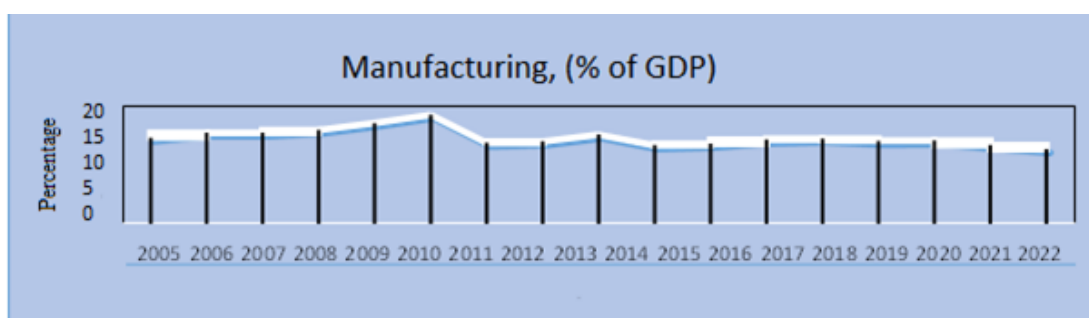


Figure 1.1 Growth of manufacturing

Source: World Development Indicators 2022

Figure 1.1 illustrates the share of manufacturing in Pakistan's GDP from 2005 to 2022. The graph shows relative stability, with minor fluctuations between 13% and 15%. A noticeable peak occurred around 2010–2011, followed by a decline, and since 2015, the manufacturing share has largely remained stagnant. Contrary to the original claim, there was no consistent increase from 2005 to 2010, nor a continuous decline

from 2016 to 2022. Instead, the data indicate a lack of significant growth over this period, suggesting structural stagnation in the manufacturing sector. This flat trend underscores the need to investigate barriers to industrial expansion and competitiveness in Pakistan (Arshad et al., 2023).

The manufacturing sector is important for the growth of both advanced and emerging nations. It is seen as a significant driver of innovation and competitiveness, making large contributions to research and development, exports, and productivity enhancement (Hitt et al., 2007).

The manufacturing sector plays a crucial role in job creation. It is regarded as a provider of employment opportunities for persons with a range of technical abilities, particularly those in the middle class (Gurria, 2018). The manufacturing sector has a multiplier influence and generates significant spill-over effects in other sectors. For example, the creation of one job in manufacturing leads to the development of two to five additional jobs in other parts of the economy (R. Khan, 2020). In addition, the manufacturing sector has the potential to provide well-compensated employment opportunities, with wages and benefits averaging 9% higher than those in the entire US economy (Rahman et al., 2019). This discussion clearly illustrates that the manufacturing sector plays a crucial role in providing employment opportunities for individuals with various skill levels in Pakistan. The manufacturing sector has a significant impact on the trade account balance of any economy. A trade deficit occurs when a country's imports exceed its exports (Rahman et al., 2019). The persistent trade deficit leads to the erosion of several high-paying and highly skilled manufacturing positions, causing skilled individuals to migrate towards low-paying industries (Hitt et al., 2007). Moreover, this trade deficit will also impose an implicit tax on future

generations, which will have a significant effect on their economic welfare (Bilal et al., 2016). A weak manufacturing sector results in a chronic trade deficit. Countries can reduce their trade imbalance by boosting and widening their manufacturing activity, as well as their service sector (Rahman et al., 2019). A nation also decreases the quantity of imported goods once it satisfies domestic needs by producing them domestically. Moreover, Pakistan has the potential to enhance its exports by focusing on manufacturing, which would ultimately lead to a decrease in its trade imbalance.

1.2.2 The Challenges faced by manufacturing SMEs in Pakistan

According to the analysis of the manufacturing sector's performance in Pakistan, it has been observed that this sector has experienced a pattern of alternating periods of rapid growth and decline, known as a boom-bust cycle (Rahman et al., 2019). In contrast, countries such as China, India, Russia, and South Africa have been successful in achieving a more diversified manufacturing sector (Rahman et al., 2019). This sector is trying to expand sustainably within the country, as it has encountered various challenges. According to Arshad (2020), Pakistan's manufacturing SMEs face outdated processing and production technology and a lack of suitable skill and training facilities for their workers. Facilitation and incentives are required to modernize industrial machinery, embrace innovative technologies, boost efficiency, and train workers in marketing, management, and international business practices.

In the view of Wadho & Chaudhry (2018), the manufacturing SMEs of Pakistan is far behind in the race for innovation. According to the Global innovation index, Pakistan's ranks 87th out of 132 economies in 2022 which is very low relative to the neighbouring countries of Bangladesh India, and Sri Lanka. Moreover, in the context of Pakistan this becomes especially important in the industrial sector since the

composition of industrial production has been largely unchanged since the 1970s (Rahman et al., 2019). The country seems to be stuck at the low end of the innovation while we do know that other Asian countries such as Malaysia, Thailand, People's Republic of China, Vietnam etc., have exhibited tremendous growth at the back of transition from low to high innovation (Khaleeq & Khaleeq, 2016).

According to Abidin, Z. U. (2023), Pakistan's poor performance in innovation clearly indicates the immense need for an extensive restructuring of the manufacturing SMEs. Considering this environment, open innovation, which Henry Chesbrough has been promoting since 2003, has recently been acknowledged as a critical innovation strategy that can assist SMEs in overcoming certain obstacles. This innovation approach allows them to share resources and capabilities with external partners, allowing them to collaborate (Chesbrough, 2003; Brunswicker, 2014). Hameed et al. (2018) argues that open innovation has facilitated the establishment of a synergistic relationship between internal and external sources of innovative information for organizations. In recent times, organizations have begun to include consumers and other stakeholders who have a direct interest in the development or final outcome of their innovation process (Hameed et al., 2018). In contemporary contexts, this concept has expanded to encompass innovations in business models and services, often within frameworks including various partnerships, groups, and entire ecosystems.

Despite the acknowledgement of this stimulating insight of open innovation, Pakistani SMEs are facing difficulties in creating and implementing open innovation platforms, which is negatively impacting their overall performance and competitiveness. Prior studies provide evidence that organizational Inertia is one of the hindering organizational factors to weaken SMEs from Open Innovation (Moradi

et al., 2021). Organizational inertia strengthens the organization's operational mode and strategic direction, resulting in a loss of flexibility (L. Mei et al., 2019). Drawing from the organizational inertia theory Carroll (1984) it is argued that organizational inertia limits the efficiency of resources and practices by rigid and fixed routines. According to studies, organizational inertia is not beneficial for organizations involved in advanced activities because it has a detrimental impact on performance (J. Huang et al., 2020). Researchers have also suggested that inertia hinders innovation by encouraging a "not invented here" mentality in which organizations are hesitant to adopt ideas or technology that originate outside their own borders (Moradi et al., 2021). Because of these challenges, Pakistan's manufacturing SMEs are underperforming, which impacts the country's economic growth.

Najar et al.(2020), provided a solution to the issue that little engagement in open innovation can be raised by speeding its internal and external resources, such as resources and capabilities (Hameed et al., 2021).The resources of the firm can be both tangible and intangible(Eisenhardt & Martin, 2000). Capabilities encompass intangible attributes, including both skill and knowledge(Teece, 1997). In the context of the present study, Intellectual capital (IC),therefore, is viewed as most crucial and promising resource (Arshad et al., 2023).The modern researcher defined Intellectual Capital as the incorporation of intangible knowledge resources by the firms through employees' abilities, experiences, knowledge, intrinsic and extrinsic motivation, relationships with other stakeholders, networking, the organizational structure, and systematic knowledge authorization through databases (Danish et al., 2021). As noted by Chen et al. (2015), the greater a company's intellectual capital, the greater its innovative competence to improve innovation performance. Recently, organizations have considered the importance of intellectual capital and open innovation,

academicians have witnessed a blurring of the boundaries between these areas and a tremendous amount of focus on intellectual capital in the field of innovation management research (J. Chen et al., 2015). Majority of the studies classified three components of Intellectual capital, human capital(HC), structural capital(SC), and relational capital(RC) (Shahbaz, 2021). Human capital refers to the information, skills, and capabilities that individuals possess. In the context of open innovation, Human capital assists organizations in gaining access to external knowledge and expertise, collaborating effectively with external partners, and developing innovative solutions (Danish et al., 2021). Individuals with a high level of Human capital are more likely to succeed at open innovation because they possess the skills and knowledge required to collaborate effectively with external partners (Najar et al., 2020). Human capital alone cannot ensure companies' competitiveness. This implies that even if an individual has the highest intellectual capacity, the organization will not reach its full potential if it lacks an efficient structure, measures, and procedures that enable the effective utilization of that individual's contributions. Essentially, research in the field of Intellectual Capital has proposed the existence of Structural Capital to support the development of Human Capital. Structural capital can assist firms with intellectual property management, asset protection, and the creation of efficient procedures for working with outside partners (Barkat & Beh, 2018b). Firms with little Structural capital in the form of inefficient procedures, routines, and systems face complications in achieving better innovative performance. As a result, corporations strive to integrate structural capital in order to develop organizational processes, which tend to improve operational efficiency and problem-solving capability (Rehman et al., 2017). Organizations with high Structural capital are more likely to do well because they have the systems and processes in place to handle and protect their intellectual property and

work well with outside partners (Rehman et al., 2017). Nonetheless, research shows that strong structural links improve organizational effectiveness by increasing value-generating activities. Furthermore, a company's performance is driven not just by internal resources like Human Capital and Structural capital, but also by relational capital (RC). Relational capital is the capability to build and sustain relations with important stakeholders like customers, suppliers, governments, and other institutions common in emerging economies (Khan et al., 2021). Organizations with significant relational capital are better positioned to succeed in open innovation because they have the contacts and networks required to collaborate effectively with external partners (Barrena-Martínez et al., 2020).

The efficiency of Intellectual Capital has been studied in past years, and research about the utilization of Human Capital, Structural capital, and Relational capital in different organizational settings is continuously increasing (Arshad et al., 2023). Arshad et al. (2023), constructed their research on 379 Pakistani textile SMEs and found that Intellectual Capital is vital for manufacturing companies and has a positive impact on open innovation performance. Open innovation performance requires organizations to continuously redefine their markets, restructure their operations, modify business models, and learn skills, where Intellectual Capital appears as a competitive advantage. Therefore, the present study considers intellectual capital as a resource that influences the open innovation performance of SME manufacturers through organizational agility characteristics.

Furthermore, scholars have reached a consensus regarding the significance of organizational agility in response to contemporary issues such as volatile markets, rapid innovation, and globalization. The dynamic market has made organizational

agility increasingly crucial for manufacturing organizations (Cho et al., 2023). Organizational agility helps organizations address the ever-changing business environment by improving an organization's ability to quickly identify and execute initiatives for opportunities and risks that align with the overall strategy (Mrugalska & Ahmed, 2021). Organizational agility is the dynamic capability of a business to quickly and effectively react to changing business conditions (Cho et al., 2023). Researchers have long debated the benefits of organizational agility on many aspects of innovation performance (Mrugalska & Ahmed, 2021). According to a McKinsey analysis, CEOs worldwide have long recognized that in today's unpredictable climate, agility leads to faster time to market, increased operating efficiency, more content consumers and workers, and higher profits (Joiner, 2019). According to the findings of an international study on organizational agility, organizations with higher degrees of agility have a clear competitive edge, which leads to increased profitability (Joiner, 2019). In addition, Organizational agility denotes the capability of an organization to react quickly to changes, allowing for the discovery of new information and promoting innovation. Since the ability to react fast is critical in the innovation process (Cho et al., 2023). The ability of a company to use organizational resources to foster innovation offers various benefits, including improved organizational performance and a competitive edge (Brüggemann et al., 2022). Hence, intellectual capital is viewed as a vital resource to enhance open innovation performance by fostering organizational agility.

In addition, the dimensions of Intellectual Capital do not directly improve open innovation performance; rather, they help to establish or create a firm's absorptive capability (AC) (Cohen & Levinthal, 1990). Absorptive capability is defined as a company's ability to recognize the value of newly acquired external knowledge,

assimilate it, and apply it to business purposes (S. Wu et al., 2021) which, in turn enhance organizational performance. According to Zahra & George (2002), Absorptive capability is a collection of organizational practices required to recognize and use knowledge, emphasizing the significance of absorptive ability in the knowledge management process. Firms can improve their innovation performance by adjusting or reconfiguring their existing abilities, resources, and policies in response to changing external conditions (Cho et al., 2023). This is conceivable if the process of integrating, distributing, and changing acquired capabilities is based on the company's current capabilities and procedures. In other words, Absorptive capability as an enhancing attribute promotes synergy between Intellectual Capital and innovation performance (Cho et al., 2023). Hence, Intellectual Capital dimensions can also improve Absorptive capability and ultimately, manufacturing firms will enhance open innovation performance.

Against this background and varied interest in intellectual capital, absorptive capacity, organizational agility, organizational inertia and open innovation performance, this study examined the impact of: a) Human Capital, Structural capital and Relational capital on organizational agility; b) Organizational agility on open innovation Performance, c) Human Capital, Structural capital and Relational capital on absorptive capacity; d) the mediating role of organizational agility between Human Capital, Structural capital and Relational capital and open innovation performance; e) the mediating role of absorptive capacity between Human Capital, Structural capital and Relational capital and open innovation performance; f) the moderating role of organizational inertia between organizational agility and open innovation performance; g) the moderating role of organizational inertia between absorptive capacity and organizational agility

1.3 Problem Statement

Small and medium enterprise manufacturers face enormous problems in Pakistan. These issues are broadly categorized as substandard product quality, low productivity, insufficient innovation, minimal value-added development, high production costs, inadequate infrastructure, and challenges with the regulatory framework (Ur Rahman & Bakar, 2019). The World Bank Enterprise Survey (2020) shows that over 40% of Pakistani businesses find power to be a main obstacle; 38% cite corruption, which reflects infrastructure and governance-related problems compromising performance.

A scrutiny of the literature suggests limited research being undertaken to explore the impact of the challenges and future expectations associated with the context of Pakistani manufacturing SMEs (Mehta et al., 2021). It is well noted that modern technologies bring enormous opportunities and, at the same time, challenges, which require immediate actions undertaken by small manufacturers in Pakistan to remain competitive (S. Ali et al., 2020). Technological disruption has significantly shortened product life cycles, which means that small and medium-sized enterprises (SMEs) must adapt quickly through innovation and responsiveness (Cho et al., 2023). However, innovation capacity in Pakistan is still weak. Only 2.3% of Pakistani firms invest in research and development (R&D), which is considerably lower than the South Asian average of 12.5% (World Bank, 2020). Furthermore, Pakistan's R&D spending as a percentage of GDP stands at just 0.16%, compared to 0.7% in India and 2.4% in China (UNESCO Institute for Statistics, 2021). This data highlights the low prioritization of innovation in both national and firm-level strategies.

To overcome these challenges and promote transformation, open innovation has recently emerged as a crucial strategy for small and medium-sized enterprises (SMEs). Open innovation allows companies to collaborate with external partners and share knowledge and resources (Oduro, 2019). For larger firms, open innovation is already an essential approach to improving performance (Audretsch et al., 2021). Pakistani SMEs face significant challenges due to both internal and external limitations (Mehta et al., 2021). These challenges include a lack of access to external knowledge, a shortage of skilled human capital, and limited absorptive capacity (Lehtimäki, 2017). These barriers hinder their ability to effectively adopt open innovation.

Additionally, small and medium-sized enterprises (SMEs) in Pakistan face significant resource constraints. According to the State Bank of Pakistan (2022), only 6.6% of total bank credit is allocated to SMEs. As a result, many small manufacturers are financially excluded, which restricts their ability to invest in innovation, capacity building, and technology upgrades.

These challenges clearly depict that manufacturing SMEs necessitate novel resources and capabilities to perform at an optimum level (Hassan & Iqbal, 2020) and enhance open innovation performance. Therefore, companies are striving to update their knowledge resources, such as intellectual capital. IC encompasses the valuable intangible assets that are strategically important for a company, as stated by Ajeeli et al., (2018). Based on the RBV proposed by Lubis (2022), it is more likely that a firm's intangible resources will have a positive effect on its performance.

Intellectual capital, which includes human capital, structural capital, and relational capital, represents strategic intangible assets that foster innovation (Ajeeli et

al., 2018). According to the resource-based view theory, intangible resources such as intellectual capital can enhance firm performance (Lubis, 2022).

Empirical studies demonstrate that intellectual capital is a crucial driver of innovation, enabling firms to achieve a competitive advantage and enhance adaptability (Bontis, 1998). In Pakistan, only 10% of small and medium-sized enterprises (SMEs) offer formal training to their employees (SMEDA, 2021). This lack of training hampers the development of human capital and innovative capacity within these firms. Additionally, about 60% of small businesses face challenges due to inadequate digital infrastructure (Pakistan Economic Survey, 2022). This deficiency weakens their structural capital and hinders their ability to effectively store, retrieve, and apply knowledge.

Organizational agility is an essential capability that enables small and medium-sized enterprises (SMEs) to respond quickly to changing environments (Yikilmaz & Cekmecelioglu, 2023). According to Munteanu et al. (2020), agility is achieved when firms can adapt to changes through a capable and responsive workforce. However, in Pakistan, most SMEs lack agility due to hierarchical structures, slow decision-making, and limited team empowerment (SMEDA, 2021).

Furthermore, research shows that intellectual capital characteristics do not have a direct effect on a firm's open innovation performance. Instead, they are critical in improving or extending the firm's absorptive capacity (Khan et al., 2021). It has been argued that absorptive capacity is necessary for expediting the process of receiving new information and using the knowledge learned to improve innovative performance (S. Wu et al., 2021). Organizations that possess a greater level of absorptive capacity are more adept at responding to evolving client needs and

identifying market trends more quickly (Abourobah et al., 2023). In Pakistan, absorptive capacity is still underdeveloped due to limited exposure to global knowledge networks and a lack of collaboration in research and development. Therefore, absorptive capacity and organizational agility act as critical mediators that transform intellectual capital into meaningful innovation outcomes (Abourobah et al., 2023).

Moreover, this study proposes a new notion known as "organizational inertia," which acts as a moderator and has a detrimental influence on open innovation performance (J. Huang et al., 2020). Organizational inertia can impede knowledge transmission, as well as flexibility and responsiveness to external information, inside manufacturing SMEs, limiting the efficacy of absorptive capacity, organizational agility, and overall open innovation performance. From a theoretical perspective, examining the effects of these constructs on open innovation performance could provide more insight into the integration of RBV, which includes intellectual capital, such as human capital, structural capital, and relational capital. Dynamic capability theory, which includes absorptive capacity and organizational agility, and organizational ecology theory, which includes organizational inertia. This combination integrates numerous resources and organizational processes, resulting in favorable consequences.

Considering the above research gap, this research intends to examine the impacts of human capital, structural capital, and relational capital on SMEs' organizational agility and absorptive capacity and, subsequently, on open innovation performance. Organizational inertia was treated as a moderating variable that is

presumed to weaken the relationships between absorptive capacity, organizational agility, and open innovation performance.

1.4 Objective of the study

The main objective of this study is to create and empirically test an integrative model that incorporates multiple theoretical perspectives by measuring human capital, structural capital, relational capital, organizational agility, absorptive capacity, organizational inertia, and open innovation performance. The study considers three major areas of literature: psychology, knowledge management, and strategic management. It provides a complete framework by combining the RBV, DCV, and the Organizational Ecology Theory. The current study examines the impact of human capital, structural capital, and relational capital on open innovation performance, considering the parallel mediating role of absorptive capacity and organizational agility, as well as the moderating effect of organizational inertia between absorptive capacity and organizational agility and open innovation performance. The overall objective of this study is to find missing intervening processes and better understand the links between human capital, structural capital, relational capital, organizational agility, absorptive capacity, and organizational inertia. This understanding seeks to address the problematic and underexplored areas of manufacturing SMEs.

Therefore, the objectives of the study are:

Ob_{1a}. To examine the effect of Human capital on organizational agility.

Ob_{1b}. To examine the effect of Structural capital on organizational agility.

Ob_{1c}. To examine the effect of Relational capital on organizational agility.

Ob₂. To examine the effect of Organizational agility on open innovation performance.

Ob_{3a}. To examine the effect of Human capital on absorptive capacity.

Ob_{3b}. To examine the effect of Structural capital on absorptive capacity.

Ob_{3c}. To examine the effect of Relational capital on absorptive capacity.

Ob₄. To examine the effect of absorptive capacity on open innovation performance.

Ob_{5a}. To examine the mediating effect of Organizational agility in the relationship between Human capital and Open innovation performance.

Ob_{5b}. To examine the mediating effect of Organizational agility in the relationship between Structural capital and Open innovation performance.

Ob_{5c}. To examine the mediating effect of Organizational agility in the relationship between Relational capital and Open innovation performance.

Ob_{6a}. To examine the mediating effect of absorptive capacity in the relationship between Human capital and Open innovation Performance.

Ob_{6b}. To examine the mediating effect of absorptive capacity in the relationship between Structural capital and Open innovation Performance.

Ob_{6c}. To examine the mediating effect of absorptive capacity in the relationship between Relational capital and Open innovation Performance.

Ob7. To examine the moderating effect of organizational inertia on the relationship between Organizational Agility and Open Innovation Performance.

Ob8. To examine the moderating effect of organizational inertia on the relationship between Absorptive Capacity and Open Innovation Performance.

1.5 Research Questions

RQ1a. What is the effect of Human capital on organizational agility?

RQ1b. What is the effect of Structural capital on organizational agility?

RQ1c. What is the effect of Relational capital on organizational agility?

RQ2. What is the effect of Organizational agility on open innovation performance?

RQ3a. What is the effect of Human capital on absorptive capacity?

RQ3b. What is the effect of Structural capital on absorptive capacity?

RQ3c. What is the effect of Relational capital on absorptive capacity?

RQ4. What is the effect of absorptive capacity on open innovation performance?

RQ5a. What is the mediating effect of Organizational agility in the relationship between Human capital and Open innovation performance?

RQ5b. What is the mediating effect of Organizational agility in the relationship between Structural capital and Open innovation performance?

RQ_{5c}. What is the mediating effect of Organizational agility in the relationship between Relational capital and Open innovation performance?

RQ_{6a}. What is the mediating effect of absorptive capacity in the relationship between Human capital and Open innovation Performance?

RQ_{6b}. What is the mediating effect of absorptive capacity in the relationship between Structural capital and Open innovation Performance?

RQ_{6c}. What is the mediating effect of absorptive capacity in the relationship between Relational capital and Open innovation Performance?

RQ₇. What is the moderating effect of organizational inertia on the relationship between Organizational Agility and Open Innovation Performance?

RQ₈. What is the moderating effect of organizational inertia on the relationship between Absorptive Capacity and Open Innovation Performance?

1.6 Scope of the Study

This study uses a cross-sectional empirical approach to examine the relationship between human capital, structural capital, and relational capital; absorptive capacity; organizational agility; organizational inertia; and open innovation performance of Pakistani manufacturing SMEs. It focuses on SMEs in the manufacturing sector because open innovation performance is weak among Pakistani SMEs.

This research also examines the role of organizational agility and absorptive capacity as mediators between the components of intellectual capital, i.e., human capital, structural capital, and relational capital, and open innovation performance.