

**The Impact of Networking on Innovation: The Case of SMEs in the
Pharmaceutical Sector in the Middle East and Africa**

Document Four: The Thesis

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This thesis (Document 4) is submitted in partial fulfilment of the requirements of Nottingham Business School in Nottingham Trent University for the degree of Doctorate of Business Administration.

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ABSTRACT

This research aims to study the impact of networking on innovation in small and medium-sized enterprises (SMEs) in the pharmaceutical sector in the Middle East and Africa (MEA) region. It particularly examines the role of networking in addressing the challenges confronting SMEs working on enhancing their innovative capabilities. Data for analysis was generated from case studies and through qualitative interviews involving 30 participants in five SMEs considered as high performers in the pharmaceutical sector in three different countries in the MEA region. This research identifies organisational and structural limitations, innovation laws and regulations, organisational culture, and economies of scale as the main challenges hindering innovation in SMEs in the pharmaceutical sector. It also indicates that the most critical factors of innovation are human factors, financial capabilities, and governmental support. This research suggests that if political will and risk-taking exist then available and abundant financial resources in some MEA countries can be directed to initiate and support pharmaceutical innovation. Moreover, the research confirms that networking can be an effective strategy for overcoming innovation challenges but underpins informal networks; one common form of networking in the pharmaceutical industry in the MEA, to play a crucial role in supporting innovative capabilities. These informal networks are influential within the pharmaceutical industry communities in the MEA region because they are highly regarded as trusted and effective sources of consultations for critical business decisions. Such informal networks are characterised by being a blend of professional and personal relationships where innovative ideas are freely, transparently, and openly discussed in a manner that depicts what can be considered the MEA's version of Open Innovation (OI). This research contributes to the literature on innovation and networking by highlighting the institutional, social, and cultural dynamics at play in SMEs in the pharmaceutical sector in the MEA and by showcasing the distinction of innovation due to contextual factors, norms, and values. The research reflects on these findings by introducing a model that comprises two levels of linked and dependent networks, blending formal and informal networks, and synchronising their contributions in a single coherent framework to drive innovation. This indicates that regional, social, and cultural aspects prove to be sources of establishing new networking norms that can serve innovation on a larger geographical scale.

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Declaration

The researcher is registered as a candidate for the Doctorate of Business Administration degree and is submitting this document in partial fulfilment of the requirements of this degree and is not registered for any other research award. The findings, propositions, and conclusions included in this document are the original work of the researcher and have not been submitted for any other academic award.

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Dedication

I dedicate this research to my mother Daad Al-Shami for her never-ending love and support, to my wife Mira Al-Sharif for standing by my side and accommodating me and giving me very precious space and time in the most difficult and demanding circumstances, and to my children; Salman, Talal, Salma, and Zaid, for being the reason for me to be better and make something good out of my life to be proud of.

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CHAPTER 1 – INTRODUCTION

1.1 Research Overview

As a concept innovation has been widely addressed in academic research (Afuah, 2020; Trott, 2020; Hietschold et al., 2020), the wider business management discipline, and has been the focus of development initiatives in private and governmental sectors throughout the world (Khalid and Sarker, 2019). Research identifies innovation as a driver for economic development and sustainable growth and is pursued by organisations in different economic sectors to gain competitive advantages (Gerguri and Ramadani, 2010; Rice, 2011). Elsewhere scholarly research acknowledges that application of innovation as well as its advancement in developed and developing countries markedly vary (Oukil, 2011; Lundvall et al., 2011). Within this body of knowledge, it is recognised that the characteristics of innovative organisations are highly affected by the degree of economic development, the regional management style, and cultural aspects (Tsvetkova et al., 2017; Sharma, 2018). This suggests that, in some way, there is a link between innovation and the dynamics of growth and prevailing macro-economic factors that include economic outputs and unemployment rates. Moreover, recent studies have argued that innovation is impacted by critical factors that include resource deficiencies, inadequate infrastructural elements, and lack of capabilities (Ross et al., 1999; Seruga et al., 2014; Alemayehu et al., 2018). Human resource, in the form of strategic leadership and innovation champions, was emphasised by scholars as one significant factor that reflects positively on the effectiveness of the innovation process (Pavitt, 2005; Hitt et al., 2010; Schilling, 2017). Other factors that were identified to influence the innovation process include know-how, financial resources, and infrastructure (Uden et al., 2017).

For the purposes of this research, the term innovation will be used in the context of pharmaceutical innovation which has been defined as "the discovery, development, production, and delivery process that enhance the availability of medical products and people's access to them and in this case, medical products include diagnostics, drugs, vaccines, and medical devices" (Berger et al., 2016, p. 11). Innovation in the pharmaceutical industry includes discovery, preclinical, and clinical test stages, that are

needed to generate leads and targets to be explored by drug developers, and requires a substantial investment, which is not usually available for SMEs (Scherer, 2000). Additionally, conducting clinical tests requires health system infrastructure which is usually limited or unavailable in developing countries (Longo, 2011; Scholz et al., 2015). The pharmaceutical industry in the MEA region is one of the main sectors that are highly dependent on continuous innovation. Innovation in SMEs in the pharmaceutical sector in the MEA region is particularly important and imperative for sustainability and growth because of the changes and dynamics that are impacting the markets in this region (IQVIA, 2018). The localisation of the pharmaceutical industry and the increase in healthcare coverage towards cheaper generic pharmaceutical products are among the main factors that are affecting this industry in terms of increased competition and reduction of regulated selling prices (IQVIA, 2018).

However, the innovation process in SMEs in the pharmaceutical sector in the MEA is often interrupted because of the lack of resources necessary to proceed with the innovation; whether technological, financial, human, or other resources (Seruga et al., 2014; Alemayehu et al., 2018). Initially, an innovative organisation utilises its resources to sustain innovation and develop it further (Demirkan, 2018) and with time, it is conceivable that adjustments need to be made consistent with the requirements of innovation. Such adjustments often involve changes to the organisation's infrastructure, employing additional expertise to support the development process, or utilising more financial resources to cover certain capital investments or working capital requirements (Chesbrough, 2006). During the preliminary and early stages of an innovation cycle in an organisation, existing resources and the incremental changes thereon are usually covered through its existing or accessible resources (Afuah, 2020). This normally continues to a level sufficient to sustain the innovation thrust and indicate its viability and potential scientific and commercial breakthroughs (Zheng et al., 2010). However, as the innovation progresses further, it reaches a stage at which a significant investment is required to realise the commercialisation aspect and achieve actual returns (Engel and del-Palacio, 2009). This situation creates a gap between the innovation being sought

after and its application in terms of availing the financial resources, the appropriate innovation environment, and the physical infrastructure needed to bridge this gap.

Innovation within the pharmaceutical sector in many developing countries is usually based on internal research and development (R&D) and faces a gap to commercialisation. This is due to the fact that innovation initiatives are originated, incubated, and followed up by utilising an organisation's resources that are usually insufficient or inadequate to handle some revolutionary or innovative ideas that require capabilities beyond that of the organisation (Krippendorff, 2019). Some organisations tend to depend on cooperation with universities to support the innovation efforts, mainly in terms of infrastructure and human capital (Barnes et al., 2002). In addition, some universities might substitute financial resources with assistance and cooperation in running certain studies and experiments needed for innovation (George et al., 2002). Other organisations tend to utilise the services of postgraduate students to conduct detailed research work related to their studies and based on innovative ideas usually generated by the organisation (Bérubé, 2019). Although this approach provides a cost-effective solution of dedicated and flexible human resources to carry out research works and activities, it has the disadvantage of interrupting the innovation progress when the student leaves or ends study-related research. Moreover, such an approach lacks the institutionalisation of research as a process within the organisation and the establishment of a structured knowledge application management practice (Sandhawalia and Dalcher, 2011; Abbas and Sağsan, 2019).

An example of innovation that faces a gap to commercialisation due to lack of sufficient resources; such as financial resources, is transforming the generic pharmaceutical industry into an innovative industry through the introduction of value-added products or super generics. A generic pharmaceutical product is an interchangeable and bio-equivalent version of an originator pharmaceutical product that is manufactured and marketed after the expiry of patent of the originator product (Alfonso-Cristancho et al., 2015). A super generic drug is an improved version of an original drug whose product patent protection has ended (Ross, 2010). The form of improvement can be in manufacturing, reformulation technology, or drug delivery and this type of product is

manufactured in a re-innovation approach falling between radical and incremental innovation (Barei et al., 2013). Due to the absence of an identical reference product, companies introducing super generics have a higher regulatory risk in obtaining marketing authorisation in comparison to strict generics manufacturers, which creates an obstacle towards commercialising such innovative products (Barei et al., 2013; Lee et al., 2016).

Rothwell (1994) and Leenders and Dolfsma (2016) claim that innovation is, by necessity, a collaborative effort and a networking process, where new knowledge emerges from merging previously separated ones. This is in line with the argument that innovators that perform funding, generating, and commercialising innovation are declining, and the emerging trend indicates a new way of securing resources that are needed for innovation from external sources (Chesbrough, 2003; Dogan, 2017). This link between innovation and networking highlights the concept of innovation networks which conceptualise the innovation process in grouped interactions and dyadic relationships between participating network actors (Jones et al., 2001). Innovation networks can be based on contractual agreements as formal networks or on social capital of innovation stakeholders as informal networks and they grant access to external knowledge, skills, technologies, and information (Imai and Baba, 1989; Camagni, 1991; Jones et al., 2001; Granovetter, 2018). Both forms of networks can capture categorised and specialised information and tacit knowledge that cover an organisation's need for new information to support its efforts to innovate a product, a process, or a service (Nonaka and Takeuchi, 1995; Jones et al., 2001; Simba, 2015).

Anecdotal evidence suggests that some forms of networking or collaboration are discontinued for various issues or challenges that eventually suspend the innovation process (Ahuja, 2000). Studies on such alliances have addressed factors of knowledge, expertise, scientific entrepreneurship, and strategic fit that are needed for these forms of collaboration to be effective (Oliver, 2004; Standing et al., 2008; Nielsen, 2010). However, these studies fall short of emphasising the impact of such factors on networking in settings that involve actors from developed and developing countries and they under-estimate cultural and social dynamics, values, and norms that are unique to

the MEA region. Such aspects are critical to collaborative innovation networks and shape the way SMEs in the pharmaceutical sector develop their innovations. Hence, this research aims to explore how SMEs in the MEA develop their innovative capabilities through leveraging their informal connections. Particularly, the study advances understanding of how cultural, social, and political factors influence the types of networks and support systems that shape the innovations of SMEs in the pharmaceutical industry in the MEA region. It details their innovation processes and identifies the internal and external environmental challenges confronting them as they engage in their innovation projects. Thus, the study assesses ways in which SMEs in MEA work to develop their innovative capabilities while paying attention to their context.

In order to achieve the above-stated aims, this study is guided by the following objectives:

1. To identify the challenges facing innovative SMEs in the pharmaceutical industry in the MEA.
2. To explore the interplay between organisational set-up, contextual factors, and innovative capabilities of SMEs in the pharmaceutical industry in the MEA.
3. To evaluate the role of networking in developing the innovative capabilities of SMEs in the pharmaceutical industry in the MEA.

To meet the requirements of these objectives, achieve the anticipated contribution, and explain the indicated research problem, the research addresses the following questions:

Q1: What are the main challenges affecting the capabilities of innovative SMEs in the pharmaceutical industry in the MEA?

Q2: How can innovation be identified, incubated, and developed from conception till successful commercialisation in SMEs in the pharmaceutical industry in the MEA?

Q3: How can an organisation entering a networking venture benefit from networking and develop its innovative capabilities?

1.2 Research Contributions

The anticipated contribution of this research has three folds. First, it contributes to the literature on innovation and networking by highlighting the institutional, social, and cultural dynamics at play in SMEs in the pharmaceutical sector in the MEA and by showcasing the distinction of innovation due to contextual factors, norms, and values. It also expands the knowledge of innovation networks by emphasising the crucial role of informal networks, comprising professional and personal relationships, in developing innovative capabilities. Second, it presents a new model for collaborative innovation networking that is in line with the identified contextual factors and that can be utilised by SMEs to bridge the gap between innovation and commercialisation in the MEA region. Third, the outcomes of this research have implications for academic research, policy development, and the practitioners' community. For academic research, it provides a fresh theoretical model that inspires new theorisations of innovation and networking in variable contexts. For policy-makers, it encourages debate on the support mechanisms that can be established in the context of MEA-based organisations to support their innovative activities in the region and even beyond. The study informs other pharmaceutical organisations about the innovation and networking challenges that exist in the MEA business environment so that they are aware of how best to set their ventures in a way that they can leverage on social, political, and economic factors to benefit their innovation activities.

1.3 The Scope of the Research

This research focuses on how innovations can be nurtured and incubated within SMEs in the pharmaceutical sector to transform them from conceptual ideas into commercially successful products. The research addresses this subject by studying a few innovation projects in various phases of the innovation process and outlines a direction that bridges any gaps between conception and commercialisation that hinder the continuation and success of the projects. This work shall be used as the basis to establish a model that can be implemented in similar situations where unexplored and unrealised innovative initiatives can be implemented based on applicability and commercialisation viability. Additionally, the research addresses how an innovation environment can be strengthened and protected by alleviating challenges and obstacles that might

jeopardise potential and promising innovations. Moreover, the research identifies a systematic approach for the innovation process that is workable and effective in the context of SMEs in the MEA. Finally, the research investigates the role and impact of networking between innovation stakeholders on fostering and developing innovation projects and the means to prepare for and benefit from such collaboration in developing innovative capabilities.

1.4 Contextual Insights

This section illustrates some basic information related to the pharmaceutical market in the MEA region, with a focus on a few countries that were included in this research; namely, Saudi Arabia, Egypt, Jordan, and the United Arab Emirates (UAE). The first three countries were selected for their significant contribution to the overall pharmaceutical market in the MEA in terms of value, volume, and technology, while the UAE was selected for its ambitious nature in pioneering innovation and creativity in the MEA (see IQVIA, 2018, 2021; Wilkins and Emik, 2021). Hence, these countries are anticipated by the researcher to adopt the implementation of the innovation model presented in this research as a framework for pharmaceutical innovation.

According to the published reports on the pharmaceutical market insights in the MEA (IQVIA, 2021), the overall pharmaceutical market in the MEA region is experiencing steady growth and most markets are following this trend. In addition, the contribution of local and regional companies to pharmaceutical sales has slightly grown in terms of value, which indicates the steady acceptance of local and generic industries by prescribers and consumers. Overall, the MEA pharmaceutical market has reached \$29.53 B value and 8.06 B Units in 2021 (IQVIA, 2021). Value sales growth has been at 5.4% PPG (Previous Period Growth) and 8% CAGR (Compound Annual Growth Rate) while volume sales growth has been -1.4% PPG and 4% CAGR (IQVIA, 2021). The retail channel dominates the MEA market with 68% (\$20.1 B) share in value sales and 74% (6.0 B Units) in volume (IQVIA, 2021). The growth of the institutional channel has increased in terms of PPG (2.6%) in value but declined to -8.2% PPG in volume (IQVIA, 2021). MNCs (Multi-national Companies) dominate the market with 59% share in total value sales, while Local companies have grown at 7.4% PPG in value and -0.8% PPG in volume (IQVIA,

2021). Systemic Antibacterial is the top TA (Therapeutic Area) holding 8% of value share with the highest market contribution in Egypt (27%) and highest growth in Kuwait (11% PPG) (IQVIA, 2021). Saudi Arabia, the largest market in MEA at \$8.5 B in value, expanded at 1.2% PPG in value terms, while Egypt is the 2nd largest market with \$6.0 B in value has seen a growth of 11% PPG (IQVIA, 2021). These patterns have resulted in a change in the manner some leading MNCs approach the pharmaceutical markets in the MEA. In June 2022, the Ministry of Investment in Saudi Arabia announced signing an agreement with the MNC Novartis, the world's 5th largest pharmaceutical manufacturer. The agreement was based on five strategic pillars to expand Saudi Arabia's burgeoning pharmaceutical capabilities and Novartis' local footprint in clinical trials, research and development, local manufacturing, and increase access to innovative therapies. This is an indication of how leading MNCs perceive the MEA as a potential region for pursuing innovation projects and establishing partnerships with regional entities, hence the need to address and study innovation networks.

Based on the published reports on the pharmaceutical market insights in the MEA (IQVIA, 2021), by 2025, the global pharmaceutical market is expected to reach \$1.6 T; the Middle East and Africa pharmaceutical market collectively to be \$56 B. Middle East and Africa pharmaceutical market is forecasted to reach ~\$47 B in 2022 and is collectively growing at 2.5% (2016 through 2020).

Although the information presented in this section illustrates that the pharmaceutical market in the MEA is experiencing a steady growth, the market share of local and regional manufacturers is less than that of multinational companies in terms of value and more in terms of number of units. This is due to the fact that generic pharmaceutical products are usually cheaper than originator products and widely available from many competing manufacturers. This situation emphasises the need to differentiate products through innovation, explore the means to overcome innovation challenges, and secure resources and capabilities that are not usually available for innovative SMEs in the pharmaceutical sector in the MEA.

1.5 Structure of the Document

This research comprises six chapters as per the following:

Chapter 1: Introduction

The introduction chapter introduces the main concepts and variables that are addressed in this research and provides a general theoretical background of their connectivity. It also includes the scope of the research and highlights the problem it studies. This chapter sets the scene for this research and illustrates the structure of the document. In addition, this chapter provides the views related to the research implications and the perceived stakeholders and identifies the research objectives and questions. It also includes some contextual insights into the pharmaceutical industry in the MEA.

Chapter 2: Literature Review

This chapter includes the results of a comprehensive and critical review of the literature pertaining to innovation, networking, and the commercialisation of innovation in SMEs in the pharmaceutical sector in the MEA region and highlights the limitations within this literature on the impact of networking on developing innovative capabilities. The review identifies connectivity between the research variables including innovation, innovative capabilities, innovation process and factors, and networking and concludes with a tentative theoretical framework.

Chapter 3: Research Methodology

This chapter illustrates the research plan in terms of the philosophy, approach, methodology, design, strategy, and data collection techniques. It explains the rationale for the research plan and its applicability as per the scope of the research and the studied subjects. It also indicates the use and reasons for conducting pilot studies and their results. In addition, the chapter sets the selection criteria for selecting organisations for conducting case studies and a list of the actual organisations that participated in the research. The coding system used for each participant in the research is also included and explained in this chapter and it concludes by explaining the ethical compliance of this research.

Chapter 4: Findings

This chapter includes a detailed illustration of the results of individual case studies that were conducted in this research including a chronological presentation of innovation-related events that were addressed in each case study. It also provides a general overview of each participating organisation and the results of the case study classified according to the identified research themes. The chapter carries on with a detailed cross-case analysis that is also centred on the research themes and sub-themes as per the outcomes of the case studies. The chapter presents the research findings and propositions that are based on the case studies, interviews, and fieldwork and explains their bases.

Chapter 5: Discussion

This chapter starts with a suggested model for collaborative innovation networking that addresses the research objectives and explains its functionality. It also explains how the objectives of the research were met and highlights findings that expand relevant literature on the research identified variables and their connectivity.

Chapter 6: Conclusion

This chapter concludes the research by presenting the findings that answer the research questions. It also maps the tentative connections between the research variables and the research findings and propositions and classifies these findings according to the research themes. The expected impact of this research is presented in this chapter covering the organisational, industry, personal, community, and country leadership dimensions. It also depicts some actual realised impact during this research on the personal dimension of the researcher. The chapter also presents the research limitations as perceived by the researcher and identifies areas for further related research. The contribution of this research is highlighted in this chapter where new anticipated additions to the body of knowledge are highlighted.

CHAPTER 2 - LITERATURE REVIEW

2.1 Overview

This chapter summarises, synthesises, and critically reviews the literature pertaining to innovation, networking, and the commercialisation of innovation in SMEs in the pharmaceutical sector in the MEA region. In doing so it highlights the limitations within this literature on the impact of networking on developing innovative capabilities and facilitating innovation projects in such a way that spotlights the need for new insights and direction in research on these concepts. The literature review starts by evaluating the way innovation is conceptualised; particularly pharmaceutical and biotechnology innovation, and the way scholars conceptualise the innovation process. Following that, the review critically evaluates and analyses the main themes of innovation factors and networking identified by key scholars, such as Rothwell (1994), Chesbrough (2003), Fagerberg (2003), and Pavitt (2005), which impact the progress of innovation and critically analyses them. The concept of networking is investigated in terms of its role in providing resources that are considered essential for innovation. In addition, its effectiveness in integrating the efforts of different organisations towards innovation is studied. This is to be explored particularly focusing on the role of networking as a catalyst for knowledge capability deficiencies in SMEs in the pharmaceutical sector in the MEA region.

In addition, the research evaluates the factors that are critical to innovation in the pharmaceutical industry and studies how an organisation can assess its readiness for collaborative networking. Furthermore, the research reviews the literature on the concepts of innovation, innovation process, and networking and explores it for coherent insights serving the research objectives in an iterative process (Gray, 2004).

While conducting the literature review, the researcher contributes with reflective interpretation in an analytical flow (Gray et al., 2018), and outlines the outcomes within the context of the research topic. Moreover, the researcher identifies the main camps among different scholars addressing the research topic and themes and looks for gaps in the work done by scholars that can be linked to the research topic (Cronin et al., 2008).

The chapter concludes with a tentative association of the variables in extant literature that are related to the research topic and objectives.

The research follows a narrative literature review approach because it is useful for synthesising a large body of literature and inspiring the research by identifying gaps that it can fill in (Cronin et al., 2008). In addition, the narrative literature review helps to identify and interpret data and explore different perspectives on the dynamics and determinants of innovation (Moenaert et al., 1994; Vicente-Saez and Martinez-Fuentes, 2018).

2.2 Innovation

The way scholars have defined innovation has evolved from the notion of introducing new products (Schumpeter, 1934), identifying the influencing factors (Van de Ven, 1986) to reaching the marketplace through commercialisation (Freeman, 1982; Fagerberg, 2003; Timur and Antanas, 2017; Hensmans, 2021). Other scholars have linked the success of innovation to successful commercialisation and highlighted that innovation must create a commercial product (Hitt et al., 2010; Dana et al., 2019). While these definitions address the stages, outcomes, and impact of innovation, the effect of uneven dynamics of growth and development worldwide on innovation and its dependence on the existence of certain macro-economic factors, infrastructural elements, resources, capabilities, and culture was unobserved. In relation to this, associating the definition of innovation with such factors and investigating the issues hindering innovation in certain regions, such as developing countries, is an area this research explores.

Emerging scholarly work on innovation (e.g., Ramadani et al., 2019) defines innovation in different ways expressing that it is the practical implementation of an idea into a new process or device by utilising existing technology but with unclear reference to innovation success factors. Others have a more comprehensive and categorised perspective that addresses innovation's dimensions and degrees (Goffin, 2017). The way innovation can be classified is identified as degrees of innovation; including incremental, breakthrough, and radical, and the degree of innovation can apply to any dimension, usually to reflect the newness of innovation and how far it is from the current practices (Hitt et al., 2010; Öberg, 2019). This categorised definition of innovation is sought to

provide grounds for a focused analysis of innovation in specific situations, such as discovering an anticipated radical innovation within a pharmaceutical organisation that lacks the basic requirements for innovation. In addition, there has been a detailed review of the importance of various forms of collaboration on the success of innovation and how organisations, in general, share their resources to establish a ground for an integrated structure to facilitate the innovation process (see for example Rothaermel and Hess, 2007; Engel and del-Palacio, 2009; Zheng et al., 2010). But the context of MEA and especially its pharmaceutical sector as one main domain for innovation is not well-represented in the literature. In addition, the limited knowledge that is available on innovation and commercialisation of pharmaceutical products is scattered and largely fragmented (see Simba and Ndlovu, 2014; Bucciari et al., 2021).

From the European perspective innovation is defined as the “implementation of a new or significantly improved product or process, or new method in business practices, workplace organisation, or external relations” (see European Committee for Standardization/National Standards Authority of Ireland (NSAI) according to the Technical Specification CEN/TS 16555-1:2013). The definition of the innovation process in terms of the activities that form innovation and match it to the market needs (Organisation for Economic Co-operation and Development (OECD), 1992; Pavitt, 2005) is another perspective of linking innovation to commercialisation and these viewpoints highlight the relevance of organisations with commercial arms to initiate and incubate a mature innovation process (Fagerberg, 2003). A similar illustration of the innovation process was introduced by Chesbrough (2003) who identified three areas along the innovation process; funding, generating, and commercialising innovation and considered the organisations that performed these three phases as fully integrated innovators (Dogan, 2017). However, Chesbrough (2003) indicated that organisations practising this type of integration are on the decline, and the emerging trend indicates a new way of securing resources that are needed for innovation from external sources. From that perspective, these categorisations are general and are not easily linkable to specific organisational functions that are involved in an innovation process to render them

beneficial in analysing the process, especially in terms of identifying functional responsibilities, process flows, and innovation milestones (Jugend et al., 2018).

Due to the lack of a generalised model that applies to all processes of technological innovation, organisations need to develop innovation models according to their needs (Forrest, 1991). This perception creates a challenging situation for innovative organisations and might result in less efficient and effective innovation processes, implying the need to define generic applicable processes. Contrary to this perception, other scholars discuss a general model that drives development processes effectively and efficiently; which is the Stage-Gate New Product System (Cooper and Kleinschmidt, 1991; Gassmann and von Zedtwitz, 2003; Schilling 2017), especially when the consideration is towards the cost of pushing unsuccessful projects forward and evaluating risks at each stage of the development process. However, although this model provides identified milestones for the crucial go/kill decisions across the development process, it falls short of how it fits into a collaborative innovation project and how such crucial decisions will not create conflicts.

Other scholars (e.g., Christensen, 1992; Lee and Trimi, 2018) had a different view of innovation. Their scholarly works focused on the innovation cycle S-curve comprising planting and harvesting innovation, leaving limited flexibility to analyse and evaluate the stages of innovation in other contexts. Contrary to this view, the enabling part of the "Structured Product Development (SPD)" model (Ahmed and Shepherd, 2010, p. 177) allows for more flexibility in segmenting and analysing the innovation process. This model facilitates studying the efficiency and effectiveness of the output and how the organisation's culture, systems, and resources are operated to achieve commercialisation of innovation.

The innovation definition by the European Committee for Standardization/National Standards Authority of Ireland (NSAI) as the "implementation of a new or significantly improved product or process, or new method in business practices, workplace organisation, or external relations" will be adopted in this research. As for pharmaceutical innovation, the definition to be adopted is "the discovery, development, production, and delivery process that enhance the availability of medical products and

people's access to them and in this case, medical products include diagnostics, drugs, vaccines, and medical devices" (Berger et al., 2016, p. 11). This selection was based on the relevance of these definitions to the identified research problem and objectives and on depicting the stages that encounter the challenges and issues SMEs in the pharmaceutical sector in the MEA are confronted with while involved in innovation projects.

2.3 The Innovation Factors

Innovation in organisations is known to cover a range of activities from generation of ideas to testing of prototypes and commercialisation (Conway, 2015). Research suggests that small organisations suffer from limited research and development, human, financial, and knowledge capabilities (DiMasi et al., 2016; Horvath et al., 2019). These factors have profound implications for how they impact and drive the innovation process. The human resource, in the form of strategic leadership and innovation champions, was emphasised by scholars as one significant enabler that can reflect positively on the effectiveness of the innovation process (Rothwell, 1994; Souitaris, 2003; Pavitt, 2005; Hitt et al., 2010; Schilling, 2017). However, direct interviews with managers of functions related to innovation indicated that some difficulties accompany utilising such human resources; especially in terms of recruiting employees with the needed competencies and identifying their authorities and responsibilities (Kinkel et al., 2017). These difficulties and other possible hindrances related to the utilisation of the human factor in the innovation process need to be highlighted and proven resolutions become crucial. In addition, linking such difficulties and resolutions to any regional or contextual differences renders them more practical and of value to organisations confronted with similar situations in other settings.

The innovation process is influenced by three basic factors of strategy, finance, and organisation and these factors change with time and between different industrial organisations (Lazonick, 2005). This is in line with the argument raised in Chapter 1 stressing that additional resources, such as financial, human, and infrastructural are required for the innovation process as it progresses over time. Moreover, Lazonick (2005) focused on the organisational social conditions within which these factors

interact and on optimising the use of existing resources rather than providing additional ones beyond the capabilities of the innovative organisation. Such additional resources can be provided through collaborative networks (Jones et al., 2001; Simba, 2013, 2015; Simba and Ndlovu, 2014) or other means, especially during scale-up and expanded commercialisation stages (Dana et al., 2019). While networking and collaboration are important factors that drive the innovation process (Rothwell, 1994; Powell, 1996; Leminen et al., 2016; Walsh et al., 2016; Dodgson, 2018), other factors that are related to the know-how, the innovative human capital, and the innovation infrastructure, have also been considered important (Ahmed and Shepherd, 2010; Tidd et al., 2009; Uden et al., 2017).

The issue of culture and its effect on innovation was addressed by several scholars by referring to the culture of the organisation (Forrest, 1991; Conway, 2015; Tian et al., 2018), or as a cultural dimension comprising individualism, determinism, distance perception, and complexity (Moenaert et al., 1994; Souitaris, 1999; Salehan et al., 2018). Other scholars highlighted how some organisations prefer to innovate on their own and be independent and self-reliant for cultural or social reasons (Hofstede et al., 2005; Neumeier, 2017; Walsh and Winsor, 2018). From the perspective of commercialisation, some scholars discussed the effect of factors of knowledge, capabilities, skills, facilities, market knowledge, and financial resources on the market success of a newly developed product (Twiss, 1992; Fagerberg, 2003; Derbyshire and Giovannetti, 2017). These views fall short of weighing cultural factors that hinder innovation initiatives versus the anticipated gain an organisation can achieve by a change of culture. They are also limited in terms of elaborating on how the measures that organisations take to eliminate or minimise the impact of existing cultural limitations on available innovation projects with partners from different cultural backgrounds or practices transpire. In addition, extant literature lacks clear insights into the importance of regulations as a determinant of the innovation process within the possible scope of innovation in the MEA.

In his description of the different generations of the innovation process, Rothwell (1994) discussed five generations: technology push, market pull, the coupling model, the integrated model, and the parallel and integrated model. Rothwell (1994) indicated that

the success or failure of the innovation process can rarely depend on a single factor, but most probably is multi-factored. This is in line with the argument related to this research indicating that multiple factors affect the innovation process along its stages. Other scholars argue that innovation is driven by external sources (Van de Ven, 2005) and a variety of factors (Fagerberg, 2003) and that success or failure of innovation can rarely depend on one or two factors (Ahmed and Shepherd, 2010). However, the relative importance of innovation factors and how additional requirements can be satisfied to support an innovation process within the context of SMEs in the pharmaceutical sector with limited capabilities need to be addressed.

Other scholars have shed light on an organisation's quality human capital; in terms of the level of education and skills, as an important factor supporting innovation. They indicated that this was evident through facilitating the learning by doing and the interactive style of innovation that depends on interaction with experts with applied education (Rothaermel and Hess, 2007; Stuart et al., 2007; Ramadani et al., 2019). Moreover, Niosi and Queenton (2010) explained that strong ties with bio-scientists; especially those with a patent-filing record, reflect positively on the performance of biotechnology firms and their future growth. Although Rothwell (1994), Van de Ven (2005), Ahmed and Shepherd (2010), Forrest (1991), and Fagerberg (2003) have mentioned that their identified factors of effect on innovation are different in terms of importance, the effect on the innovation process was not clearly indicated. Additionally, identifying factors that drive innovation in the pharmaceutical industry in the MEA and whether they affect the innovation process positively or negatively is an area that requires elaboration.

Much of the literature on factors affecting innovation was inclined towards studying this aspect in the USA and other developed western countries and has overlooked other parts of the world, such as developing countries (White, 1988; Simba and Ndlovu, 2014; Simba, 2015). However, it was indicated that the characteristics of innovative organisations are highly affected by the degree of economic development, the regional management style, and cultural aspects and that utilising the outcomes of studies on innovation in advanced countries in less developed countries is inapplicable (Nejad,

1997). This highlights the need to identify the aspects that affect the innovation process in different countries and evaluate their relative effect relevant to regional settings. Such aspects include technological heritage, administrative heritage, market structure, and regional entrepreneurship with more influence of the local cultural context (Moenaert et al., 1994). This illustration is in line with the main argument being advanced in this research concerning the significance of cultural consideration and limitations on the progress of innovation or its realisation in the first place. However, the impact of economic development in a country on innovation is an area that requires investigation due to the examples of countries with low macro-economic indicators, such as some Far Eastern countries, that have achieved advancement in terms of innovation in different fields.

Mytelka (2006) studied and identified some drivers for innovation in developing countries, including prevailing healthcare issues and incentives directed to firms to master relevant technology. Mytelka also identified some obstacles influencing innovation in developing countries, such as high research costs, continuous innovation, patent intensity, low levels of trust, and lack of policies to deal with causes of mistrust between different innovation parties. The assumption that innovation is hindered in developing countries by financial issues might be debatable in some countries in the MEA where financial resources are abundant. This changes attention to another area that was overlooked in the literature which is how available financial resources can be managed and channelled to build innovative capabilities and support innovation projects.

The key findings and associated key sources of this section are summarised in table 1.

Table 1: Key Findings and Sources of Innovation Factors Literature Review

Innovation Factors	Key Sources
limited research and development, human, financial, and knowledge capabilities	(DiMasi et al., 2016; Horvath et al., 2019)
The human resource, in the form of strategic leadership and innovation champions, is one significant enabler that can reflect positively on the effectiveness of the innovation process	(Rothwell, 1994; Souitaris, 2003; Pavitt, 2005; Hitt et al., 2010; Schilling, 2017)
Competencies, authorities, and responsibilities of human resources	(Kinkel et al., 2017)
Strategy, finance, and organisational social conditions	(Lazonick, 2005)
Networking and collaboration	(Rothwell, 1994; Powell, 1996; Leminen et al., 2016; Walsh et al., 2016; Dodgson, 2018)
Know-how, innovative human capital, and innovation infrastructure	(Ahmed and Shepherd, 2010; Tidd et al., 2009; Uden et al., 2017)
Organisational culture	(Forrest, 1991; Conway, 2015; Tian et al., 2018; Moenaert et al., 1994; Souitaris, 1999; Salehan et al., 2018; Hofstede et al., 2005; Neumeier, 2017; Walsh and Winsor, 2018)
knowledge, capabilities, skills, facilities, market knowledge, and financial resources	(Twiss, 1992; Fagerberg, 2003; Derbyshire and Giovannetti, 2017)
Organisation's quality human capital in terms of the level of education and skills and strong ties with bio-scientists	(Rothaermel and Hess, 2007; Stuart et al., 2007; Ramadani et al., 2019; Niosi and Queenton, 2010)
Degree of economic development, regional management style, and cultural aspects	(Nejad, 1997)
Technological heritage, administrative heritage, market structure, and regional entrepreneurship with more influence of the local cultural context	(Moenaert et al., 1994)
Prevailing healthcare issues, incentives directed to firms to master relevant technology, high research costs, continuous innovation, patent intensity, low levels of trust, and lack of policies to deal with causes of mistrust between different innovation parties	(Mytelka, 2006)

2.4 Innovation and Networking

Innovation was initially perceived as a process that is directly attributable to individual entrepreneurs and small firms operating in competitive sectors and later the importance of big and often monopolistic organisations, with their interacting functions, was acknowledged in proceeding with innovation (Schumpeter, 1942; Malerba and Orsenigo, 1995). Highlighting the transition from individualistic to a collective approach to innovation, these perceptions were referred to as 'Schumpeter Mark I' and 'Schumpeter Mark II' (see Fagerberg, 2003; Lazonick, 2005; Pavitt, 2005; Keklik, 2018). However, Schumpeter focused on the role of individual and organisational dimensions, rather than networks of organisations, in leading and promoting innovation, posing a contradiction with the argument that innovation is a networking event and is positively impacted by collaborative efforts.

The involvement of multiple players in the form of a network, rather than a single entity, in the cycle of innovation, was presented by DeBresson and Amesse (1991) who argued that it was reliable and beneficial to innovation studies and that it can bridge the gap between fragmented disciplines of technology. Some leading pharmaceutical organisations have practiced networking in the sense of outsourcing certain innovation functions, such as marketing and commercialisation, following the concept of innovation marketers, which indicates that commercialisation can be performed by external organisations and not necessarily the same organisation that originated the innovation (Chesbrough, 2003; Simba and Ndlovu, 2014). Rothwell (1994) and Leenders and Dolfsma (2016) claim that innovation is, by necessity, a collaborative effort and a networking process, where new knowledge emerges from merging previously separated ones. Furthermore, in a collaborative network, an opportunity is created for multiple players to channel their differences and conflicts into synthesis rather than fragmentation, in what is referred to as creative abrasion (Leonard, 1995; Skilton and Dooley, 2010). Through a survey-based empirical analysis of product innovation, Ramadani (2019) argued that collaborative networks offer organisations the advantages of sharing costs and risks of innovation (Temel and Vanhaverbeke, 2020), especially for large projects, and provide the opportunity for faster creation of knowledge, acquiring external knowledge, and enhancing existing product portfolios (Martínez-Costa et al.,

2019). Although these perspectives provide a clear emphasis on the importance of networking for innovation, they discuss very little about the practicalities related to how an organisation can start a beneficial and successful networking exercise. In addition, this literature provides a partial view that falls short of specifying the circumstances and conditions necessary to ensure smooth and workable collaboration and how the setup might vary according to different sectors or industries, such as the pharmaceutical industry. In this context, getting the benefits of networking in developing innovative capabilities requires the identification of the network structure and the type of relations between network actors so that it can work effectively for SMEs in the pharmaceutical sector in the MEA. Elaboration is also necessary on how SMEs can avoid expected obstacles and possible sources of conflicts in networking ventures within the cultural context in the MEA region. In addition, assessing an organisation's ability to join and benefit from an innovation network by applying the concepts of networking readiness (Elenurm, 2015; Samoilenko, 2019) and networking capability (Mitrega et al., 2012; Mu et al., 2017) is an area that lacks testing on SMEs in the pharmaceutical sector in developing countries.

The position of an organisation within a collaborative network was perceived to influence the amount of knowledge and information it can gain (Kilduff and Brass, 2010), its ability to access more diverse external sources of knowledge (Dong et al., 2017), and its ability to attract more promising entrants to a network based on how central it is in a network (Powell and Gordal, 2005). In this regard, it is envisaged that acquiring a certain position within a network that includes players from developing countries requires examination. Particularly, the impact of different levels of superiority in experience, know-how, and capabilities of network actors on the success of a collaborative network and the protection of identities and interests is an area that was overlooked.

The evolution of innovation was presented by Lee and Trimi (2018) in a contemporary incremental description from closed (innovation 1.0), collaborative (innovation 2.0), and open (innovation 3.0) to a more recent co-innovation (innovation 4.0) that involves all useful sources an organisation can utilise to advance the innovation. This includes an organisation's R&D function, collaboration, and co-creation with partner entities and

customers. This is in line with an earlier argument made by Hitt et al. (2010) who argued that creating an innovative competitive advantage depends on the ability of the organisation to integrate relevant global human capital talents. However, with the involvement and interaction between more parties in this arrangement the need to resolve possible conflicts becomes necessary.

In the course of sharing resources and knowledge, whether in supply chains or in networks, some difficulties accompany bringing this into practice, which implies the need to manage inter-firm dynamics of innovation (Bessant, 2003). In consideration of this, Powell and Grodal (2005) argued that organisations with several ties to others are expected to have developed better means for sharing knowledge and resolving conflicts. Therefore, Bessant (2003) and Davis (2016) identify conflict resolution as one of the core processes in inter-organisational networking; and this research addresses this aspect as a factor for creating effective grounds for managing an effective collaboration. Moreover, common sources of conflicts in networking, the effective measures to mitigate them, and the methods for preventing the occurrence of such conflicts are areas that require elaboration based on actual and proven cases.

The link between innovation and networking establishes the concept of innovation networks which can be based on contractual agreements as formal networks or on social capital of innovation stakeholders. This categorisation was based on extending the analysis of the relationships between network actors to cover the social network or social capital of such actors leading to the introduction of informal networks (Jones et al., 2001; Golra, 2019). Both forms of networks can capture categorised and specialised information and tacit knowledge that cover an organisation's need for new information to support its efforts to innovate a product, a process, or a service (Nonaka and Takeuchi, 1995; Jones et al., 2001). Innovation networks grant access to external knowledge, skills, technologies, and information (Imai and Baba, 1989; Camagni, 1991; Granovetter, 2018) and conceptualise the innovation process in grouped interactions and dyadic relationships between participating network actors (Jones et al., 2001). However, the attributes of innovation networks and the motives to join them, especially concerning cultural factors that are prevailing in the MEA region, is an area that requires

elaboration. In addition, the perceived value and effectiveness of formal versus informal innovation networks in different regional settings is an area to extend the literature in this domain.

The classification of networks that is based on the form of relationship between network actors can be the basis for identifying other forms of networks (Powell and Grodal, 2005). There are two different types of networks; one depends on contractual or market considerations and the other depends on less formal and more primitive relationships (Powell and Grodal, 2005). An example of the former is joint-venture collaborations and the latter is common membership in a technological association. Powell and Grodal (2005) classification also addressed another dimension of the network characteristics as related to its actors, such as networks that are highly clustered, high in trust and dense, and networks that are weakly tied and provide access to mostly redundant information (Granovetter, 1973; Ahuja, 2000). Other similar classifications have identified types of networks that would fit the business and the sought prospects of networking (Misner and Hilliard, 2010). They refer to casual contact networks, strong contact networks, community service clubs, professional associations, and online networks. These aspects of classifying networks can be used to analyse networks' performance, identify reasons for their success or failure, and allow for identifying other forms of networks. Moreover, Grabher and Powell (2004) have classified networks based on governance and stability and have suggested four types; informal networks that are based on common experience, short-term project networks, regional networks that depend on spatial similarity, and purposive business networks. While this enhances understanding of the formation and function of networks, it is not context-sensitive in the sense of being silent about informal network structures which are less understood and yet prevalent in the MEA region.

The role of governments and policy-makers in innovation networks was presented in the literature in several ways; including promoting innovation, managing public-private projects, and facilitating an innovation environment on national levels (Lee et al., 2012). In addition, governments can play a key role in facilitating networking between large organisations and SMEs, creating demand and expanding market access, establishing

commercial and trade agreements, and creating business incubators (Faber et al., 2008). They can also establish the infrastructure and frameworks that can accommodate innovation stakeholders as part of creating local, regional, and international innovation ecosystems (Nambisan, 2008; Ford and Yoho, 2020; Shipilov and Gawer, 2020). This marks an interesting shift in the typical role of governments from being regulators to facilitators and underpins effective participation in private sector innovation initiatives (Yun and Liu, 2019). However, the measures that are required to ensure effective collaboration between policy-makers and private sector entities and the drivers that motivate each party to assume its role towards network actors were overlooked. Additionally, with the prevailing perception of the role of governments as rigid regulators and control entities (Majone, 2019), such collaboration requires investigation for its applicability and acceptance among innovative SMEs in the pharmaceutical sector in the MEA region.

The key findings and associated key sources of this section are summarised in table 2.

Table 2: Key Findings and Sources of Innovation and Networking Literature Review

Key Findings/Concepts	Key Sources
Transition from individualistic to a collective approach to innovation	(Fagerberg, 2003; Lazonick, 2005; Pavitt, 2005; Keklik, 2018)
The involvement of multiple players in the form of a network in the cycle of innovation	(DeBresson and Amesse, 1991)
Innovation marketers	(Chesbrough, 2003; Simba and Ndlovu, 2014)
Innovation is a collaborative effort and a networking process	(Rothwell, 1994; Leenders and Dolfsma, 2016)
Creative abrasion	(Leonard, 1995; Skilton and Dooley, 2010)
Collaborative networks offer organisations the advantages of sharing costs and risks of innovation, faster creation of knowledge, acquiring external knowledge, and enhancing existing product portfolios	(Ramadani, 2019; Temel and Vanhaverbeke, 2020; Martínez-Costa et al., 2019)
Networking readiness and networking capability	(Elenurm, 2015; Samoilenko, 2019; Mitrega et al., 2012; Mu et al., 2017)
The position of an organisation within a collaborative network influences the amount of knowledge it can gain, its ability to access external sources of knowledge, and its ability to attract entrants to a network	(Kilduff and Brass, 2010; Dong et al., 2017; Powell and Gordal, 2005)
The evolution of innovation from closed (innovation 1.0), collaborative (innovation 2.0), and open (innovation 3.0) to co-innovation (innovation 4.0)	(Lee and Trimi, 2018)
Creating an innovative competitive advantage depends on the ability to integrate relevant global human capital talents	(Hitt et al., 2010)
Sharing resources and knowledge implies the need to manage inter-firm dynamics of innovation and conflict resolution	(Bessant, 2003; Powell and Grodal, 2005; Davis, 2016)
Innovation networks can be based on contractual agreements as formal networks or on social capital of innovation stakeholders	(Imai and Baba, 1989; Camagni, 1991; Nonaka and Takeuchi, 1995; Jones et al., 2001; Granovetter, 2018; Golra, 2019)
Networks are classified based on governance and stability	(Grabher and Powell, 2004)
The role of governments and policy-makers in innovation networks	(Lee et al., 2012; Nambisan, 2008; Ford and Yoho, 2020; Shipilov and Gawer, 2020).

2.5 Open Innovation (OI)

The past two decades have witnessed an important shift in how organisations approached innovation from being dependent on their internal functions in a protective manner to utilising internal and external ideas as well as internal and external paths to market to advance their know-how. This was an extension of the concept of networking, which is usually bound by some sort of formal or informal contractual relationship (Powell and Grodal, 2005). This change of approach to innovation has utilised systems of inflows and outflows of knowledge to create value in what Chesbrough (2003) refers to as Open Innovation (OI). The main reasons for this shift were the increase in the size and movement of knowledge employees and the availability of venture capital and stock offerings (Chesbrough, 2003; Bianchi et al., 2011). The knowledge inflow was identified to bring new insights into an organisation and knowledge outflow to access external markets with existing innovation in an organised manner (Tucci et al., 2016; Randhawa et al., 2016; Bogers et al., 2017) or a combination of the two by joining external sources of knowledge and commercialisation activities (Chesbrough and Bogers, 2014).

In biotechnology which has similar innovation approaches to the pharmaceutical industry, and with its clear interaction between industry and science, the concept of OI is pursued in the form of Open Science (OS); where immediate disclosure of recent research discoveries and exchange of related materials and methods are encouraged, usually with the support of public and private institutions (David, 1998; Rafols et al., 2014). OS is based on openness and connectivity and is defined as "transparent and accessible knowledge that is shared and developed through collaborative networks" (Vicente-Saez and Martinez-Fuentes, 2018, p. 428). Hormia-Poutanen and Forsström (2016) argue that OS implies collaboration among researchers on the organisational, local, and international levels in order to generate discoveries and solutions to global issues. Within this medium of sharing proprietary knowledge and secrets, intellectual property (IP) is usually maintained in OS using trade secrets (West, 2017). While aspects of openness and transparency are crucial for the implementation of OI and OS, issues related to the reluctance to openly and transparently share information, being secretive about knowledge and internal developments, and the lack of IP rights in the MEA were overlooked. In addition, collaborative arrangements of this sort involving actors from

developed and developing countries and the consequence on the progress and success of OI and OS are less understood. Moreover, issues related to trust, readiness to share knowledge with others, and the impact of cultural aspects on such concepts in the context of the MEA was not addressed. Additionally, while OI seems ideal for the exchange of knowledge and provision of external resources, the necessary setup for collaboration as explained in OI did not indicate how possible conflicts between collaborating organisations can be predicted, controlled, and resolved. Such conflicts are probable due to the involvement of multiple parties in OI and the interaction of various styles of management. This highlights the need for a framework to ensure smooth collaboration and prevention or resolution of conflicts between collaborating parties. By bridging these gaps, the measures that can help SMEs in the pharmaceutical sector in developing countries benefit from OI opportunities can be established.

Major pharmaceutical companies are implementing OI strategies; such as innovation hubs to identify promising innovative technology and collaborate with regional SMEs in the pharmaceutical sector, alliances with external venture groups, and alliances with academia (Mytelka, 2006; Segers, 2017; Robaczewska et al., 2019). In such arrangements, the innovation process is usually managed by fully integrated major pharmaceutical companies that are able to utilise internal and external capabilities and thus assume a leading role in their networks (Segers, 2017; Sabatier et al., 2012). From that perspective, the mechanism by which such collaborations can be arranged and maintained, particularly in regions of different economic and advancement levels, was not addressed. Moreover, the literature falls short of indicating how SMEs in the pharmaceutical sector in developing countries can realise their innovative capabilities, acquire essential skills, and assume a key position within collaborative networks on the local and international frontiers.

2.6 Innovation and the Pharmaceutical Industry

The pharmaceutical industry refers to the chemical synthesis of active ingredients found in plants and in nature to produce new drugs (Mytelka, 2006) and has witnessed a major development to exploit the advancement in the biomedical field by the introduction of biotechnology (Grabowski and Vernon, 1994). Biotechnology is defined by the OECD as

“the application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods, and services.” A biological product is defined as “a virus, therapeutic serum, toxin, antitoxin, vaccine, blood, blood component or derivative, allergenic product, protein, or analogous product, or arsphenamine or derivative of arsphenamine (or any other trivalent organic arsenic compound), applicable to the prevention, treatment, or cure of a disease or condition of human beings” (The Federal Register, 2020). A bio-similar product is “a biological product that is shown to be highly similar in terms of its quality, safety, and efficacy to an already licensed reference product” (WHO Technical Report Series, No. 977, 2022). While the pharmaceutical and the biotechnology industries both produce medicines for human use, the former utilises chemical compounds and the latter uses living substances. Biotechnology is perceived as an advancement and continuum of the pharmaceutical industry (Moo-Young, 2019). However, for the purpose of this research that addresses the impact of networking on innovation in the pharmaceutical industry in SMEs, pharmaceutical and biotechnology industries are used interchangeably. This is due to the similarity in approaching innovation and in the hindrances SMEs are confronted with in both industries in the MEA.

Essential steps of pharmaceutical innovation include discovery, preclinical, and clinical test stages that are needed to generate leads and targets to be explored by drug developers and require a substantial investment; which is not usually available for SMEs (Adams and Brantner, 2010; DiMasi et al., 2016; Horvath et al., 2019). Moreover, conducting clinical trials requires a health system infrastructure; a major component of a quality healthcare system, which is usually limited or unavailable in developing countries (Longo, 2011; Scholz et al., 2015). Other challenges facing pharmaceutical innovation in developing countries include political instability, less economic freedom, the avoidance of investing in fields of high risk and dominant use of scientific knowledge, and the scarcity of innovation systems originating in developed countries (Oukil, 2011; Lundvall et al., 2011; Tsvetkova et al., 2017; Sharma, 2018). In addition, the lack of financial resources and human capacity, lack of time, regulatory and ethical systems obstacles,

lack of research environment, and operational barriers were all considered challenges facing conducting clinical trials in developing countries (Ross et al., 1999; Seruga et al., 2014; Alemayehu et al., 2018). However, several developing countries are building up capacities in the pharmaceutical sector, usually through collaboration with other countries and with strong involvement from the private sector, especially for commercialisation activities (Harris, 2004; Mytelka, 2006; Thorsteinsdóttir et al., 2010; Oukil, 2011). Contrary to these general perceptions, some developing countries do have stable economic and political stability, sufficient financial resources, and human capacities (Menaldo, 2012; Musibah, 2017) yet still lack an established base for pharmaceutical innovation. This raises questions concerning the means to manage and direct such resources and capabilities towards helping SMEs in the pharmaceutical sector in developing countries enhance their innovative capabilities. In addition, the views regarding collaboration between developing and developed countries fall short of suggesting workable models and mechanisms between SMEs in the pharmaceutical sector in the MEA and larger advanced enterprises in developed countries that can facilitate collaborations and mitigate any expected challenges.

According to the literature on biotechnology among small firms and SME networks, scholars identified different ways of building and sustaining trust as an enabling and stimulating factor for collaborative innovation and for sharing knowledge, especially tacit knowledge, in an innovation process (Hardwick et al., 2013; Massaro et al., 2019). Some scholars have discussed how trust grows between partners when a relationship shifts from transactional to a personalised one (Anderson and Hardwick, 2017). They argued that this facilitates collaboration and tacit knowledge sharing, but they overlooked highlighting if this argument is applicable regardless of regional and cultural factors. Another similar inductive framework was based on a case study and semi-structured interviews to investigate the difficulties accompanying sharing confidential information through an alliance and implementing an open knowledge exchange strategy, such as licensing, was suggested to deal with such difficulties (Bogers, 2011). Klijn et al. (2016) utilised survey material collected in three different countries, Spain, Taiwan and the Netherlands, to argue that trust enhances network performance

as it decreases uncertainty, facilitates learning, and renders relationships more stable. This argument emphasises the importance of trust-building among network actors from different countries and regions to network performance. Moreover, drawing on case study outcomes, Giest (2019) discussed two forms of trust in this context; trust that an organisation can perform its contractual obligations and trust in intentions. He highlighted the role of personal relationships, shared experiences, and third parties in trust-building, but it was not clearly indicated how this can be performed systematically. Therefore, this research pays attention to the effect of checking the previous history of potential partners for a collaborative network as part of exploring the role of networking in innovation. In addition, the case of trust-building involving actors from countries or regions of different economic dynamics and variables was overlooked. Moreover, the cultural aspects that are prevailing in certain regions such as the MEA and their impact on trust-building and sharing knowledge with others need more elaboration. This is particularly required in terms of suggesting the measures that can encourage SMEs in the pharmaceutical sector in the MEA that are involved in innovation projects to share knowledge with other organisations.

One typical example of networking in the pharmaceutical industry is strategic alliances formed between large pharmaceutical firms and smaller biotechnology firms in a mutually beneficial relationship (Schilling, 2017). Although Schilling (2017) has highlighted that such alliance relationships usually lack the common language, practices, and coordination, and can have the risk of divulging confidential information, the emphasis on cultural fit, desire for control, and collaboration experience (Hofstede et al., 2005; Emden et al., 2006; Gattringer et al., 2017) was overlooked. Such alliances are also impacted by the strategic fit that ensures the organisational objectives and motives are aligned between collaborating organisations (Easterby-Smith et al., 2008; Nielsen, 2010). These aspects might jeopardise the success of an alliance, especially when the actors involved are from different economically developed countries. However, the impact of aspects of strategic fit, cultural fit, and language fit and their relative importance to collaborative networks involving actors from developing and developed countries was not emphasised. In a study of the network characteristics that affect innovativeness in

the biotechnology industry, Demirkan and Demirkan (2012) concluded that partner quality, knowledge heterogeneity, and relational strength have a positive effect on the innovation performance of an organisation and a significant impact on the innovation outcome. However, the mechanism by which an organisation can maintain its interests and control measures and avoid any compromises resulting from dealing with superior partners, who might have an upper hand perception, was not addressed. As such, this research provides new insights on how partners of a collaborative network of various levels of knowledge and economic superiority can maintain their unique identities and interests.

2.7 Innovation and Networking in the Bio-economy

Pharmaceuticals are examples of bio-based products that form a bio-economy, which is defined as "an economy where the basic building blocks for materials, chemicals, and energy are derived from renewable biological resources such as plant and animal sources" (McCormick and Kautto, 2013, p. 2590). Based on the analysis of historical published data, the collaboration between organisations of different sizes is increasingly important for innovation processes in the bio-economy and particularly for SMEs that are playing a key role in innovation when it comes to bio-based product markets (Bauer et al., 2018). This trend indicates that such collaborations are expected to have a wider geographical scope covering different world regions where the pharmaceutical industry is growing, such as the MEA region. Accordingly, issues that might affect such collaborations on the international level need to be investigated. Based on data drawn from several high-tech SMEs, Parida et al. (2012) found that they are usually faced with the challenges associated with innovation; including high risk, uncertainty, and complexity. It was also found that high-tech SMEs generally lack the necessary financial resources, internal capabilities, competence base, systematic approaches to innovation, and access to recent scientific excellence that are provided by larger organisations (Major and Cordey-Hayes, 2003; Hossain, 2015). These arguments emphasise the emerging interaction between organisations of different sizes and capabilities for innovation projects and highlight the need to manage such interactions. However, they lack specifying other regional and contextual challenges that can hinder innovation in SMEs in different regions, such as the MEA region. Additionally, and by utilising a case-

study research strategy, Wield et al. (2013) have highlighted the importance of the involvement of players from different sectors in social and institutional arrangements to drive innovation in bio-economy. More specifically, Mitra and Milne (2013) have clarified that sharing resources, competencies, and experience, as well as risks associated with developing a new drug through a network of research partners or academic collaborations, can enhance R&D. These insights into networking and collaboration suggest possible solutions for organisations looking to improve their internal R&D activities but lack the resources and capabilities for it, such as the case in developing countries. In their illustration of the collaborative environments and the interactive approach to innovation in the translational medicine field, Wield et al. (2013) highlighted the challenge of bringing different styles of researchers, organisations, health services, and patients together. However, the way such collaborations can be administered in a manner to prevent or minimise challenges and conflicts that might hinder the progress of innovation was overlooked. From a generalised perspective, Dana et al. (2019) indicated that extant literature lacks a tool that can diagnose and identify potential obstacles that can accompany innovation projects. Therefore, there is a need to bridge this gap by investigating how to assess potential sources of conflicts, with emphasis on those arising within a collaborative network involving SMEs in the MEA. Bauer et al. (2018) argued that it is rare for a single organisation involved in an innovation project to have all the needed competencies, implying the increased frequency and significance of joining collaborative networks. Bauer and others described the factors affecting such collaborations, which include dealing with organisations having close technological capabilities; covering similarity, complementarity, and overlap (Mowery et al., 1998), the organisation's position in an industry network, and its portfolio of collaborations (Gulati, 1998). Considering this, the need for organisations to look for the quality of previous collaborations of the targeted partner organisations and the existence of any previous conflicts or issues that suspended or took previous collaborations into turbulent paths has been overlooked. Such a step is considered a measure that can assist SMEs embarking on networking projects to evaluate a collaboration opportunity and predict the entailed potential benefits. In addition, the impact of evaluating the quality of historical collaborations of potential partners on the

success of collaborative innovation networks is an area that requires further investigation. An additional factor in the same context is the absorptive capacity (AC); the ability to realise the value of external knowledge, assimilate it, and commercialise it (Cohen and Levinthal, 1990; Schilling, 2017). Based on the results obtained through a survey, Lau and Lo (2015) argued that organisations need to develop their AC to improve their knowledge in accessing external knowledge generated through networks while maintaining a balance with internal knowledge creation (Lewin et al., 2011). Recent studies that have addressed the effect of collaborative innovation networks on developing innovative capabilities have indicated that a positive impact can be achieved only in the presence of AC (Najafi-Tavani et al., 2018). This aspect raises a concern related to the levels of existing knowledge and knowledge creation practices in organisations seeking further learning as part of their innovation initiatives. In addition, the application of this concept to external partners from different industries entering collaboration projects with SMEs in the pharmaceutical sector is overlooked in extant literature. This is crucial in the sense of evaluating the creation of sufficient awareness and understanding of the nature of the pharmaceutical industry as a requirement to facilitate networking and is an area that can extend the literature on AC.

Bauer et al. (2018) introduced a model for studying the characteristics of organisations participating in a collaborative network and the corresponding effects on collaboration. Bauer and others classified those characteristics into endogenous (structure-based) effects that include the tendency to have reciprocal ties with other parties and the preference to collaboration with other organisations that already have many ties (Snijders et al., 2010). Another relevant attribute was linked to the tendency to collaboration with entities with which they already share partners for better knowledge sharing (Cowan et al., 2007). Bauer et al. (2018) focused on other important aspects identified as additional effects on collaboration, which are an organisation's trust and knowledge of other parties resulting from previous alliances (Gulati and Gargiulo, 1999), the role of an organisation in a collaborative effort, and the resulting amount of generated information it can access and gain from. As mentioned earlier, the historical knowledge about potential partners and issues to be considered when evaluating the

degree of trust of other organisations were not addressed in this model. Thus, this research builds on this model by exploring the factors for selecting proper partners for collaboration. Lancker et al. (2016) argued that for a transition to be reached in bioeconomy, new and disruptive innovation is required, and innovation will be based on a complex base of knowledge from a variety of technologies and sciences, such as biotechnology (Golembiewski et al., 2015). In addition, a high level of cooperation is needed between various actors from different levels and sectors, such as academic institutions, funding agencies, and industrial organisations, to create the complex knowledge that is essential for innovation (Staffas et al., 2013). With such involvement of many different entities, the need for a collaboration model that facilitates the interactions between different actors and identifies the critical parameters of networking becomes a necessity. This is especially important when the actors are influenced by different regional and cultural issues. Other impacting factors are related to commercialisation of bioeconomy-based products that can be challenging because of high switching costs or lack of quality standards and the fragmented and complex policy schemes forming another challenge for innovation in bio-economy (Lancker et al., 2016). Accordingly, the effect of these factors, considering the dynamics and attributes related to developing countries, on innovative organisations needs investigation. Moreover, Lauritzen and Karafyllia (2019) have discussed the use of external Innovation intermediaries and consultancy to handle and mediate conflicting demands arising from innovation collaborations and how that reflects in less discipline from employees and less passion from external helpers. In this regard, how such external advisory services can be integrated to achieve their anticipated contribution to a collaborative network effectively is an area of interest in this research.

2.8 Innovation in MEA

The management of innovation in the pharmaceutical sector in the MEA region is an under-researched area since much of the available literature on factors affecting innovation was inclined towards studying this aspect in the USA and other developed western countries (White, 1988). However, it was indicated that the characteristics of innovative organisations are highly affected by the degree of economic development, the regional management style, and cultural aspects and that utilising the outcomes of

studies on innovation in advanced countries in less developed countries is inapplicable (Nejad, 1997). This motivates this research to emphasise the effect of regional aspects on any suggested innovation framework and to highlight the necessary adjustments to adapt to local circumstances. There are four aspects that affect the innovation process in different countries including technological heritage, administrative heritage, market structure, and regional entrepreneurship with more influence of the local cultural context (Moenaert et al., 1994). This emphasises the significance of cultural consideration and limitations on the progress of innovation or its realisation in the first place. Mytelka (2006) studied and identified some drivers for innovation in developing countries, including prevailing healthcare issues and incentives directed to firms to master relevant technology. She also identified some obstacles influencing innovation in developing countries, such as high research costs, continuous innovation, patent-intensity, low levels of trust, and lack of policies to deal with causes of mistrust between different innovation parties. In considering that, the need to extend the literature by suggesting possible ways that can enhance innovation in the pharmaceutical sector in the MEA region by overcoming such obstacles becomes a necessity.

SMEs in the biotechnology business within developing countries confront numerous obstacles. Their innovations are often limited due to their lack of resources including financial, human, and knowledge capital (Hossain, 2015; Alemayehu et al., 2018). Moreover, research suggests that they also lack guidance to establish a sustainable biotechnology ecosystem (Lokko et al., 2018). Studies elsewhere (e.g., Vrgovic et al., 2012; Salicrup and Fedorkova, 2006) suggest that such a conundrum can be approached through collaborative alliances with developed countries and international organisations. In addition, and based on this assessment, developing countries can improve capacity building and develop technologies that are appropriate to regional needs and provide solutions to regional health issues and support R&D capabilities (Varmus et al., 2003; Marshall, 2004). However, challenges related to regional characteristics and differences pertaining to cultural issues, business practices, risk-taking, and trust-building, which are more apparent in an international setting, were overlooked. Against that backdrop, there is a need for studies that focus on these

regional factors and challenges, especially in developing countries as doing so significantly enhances understanding of context-specific factors influencing collaborative alliances.

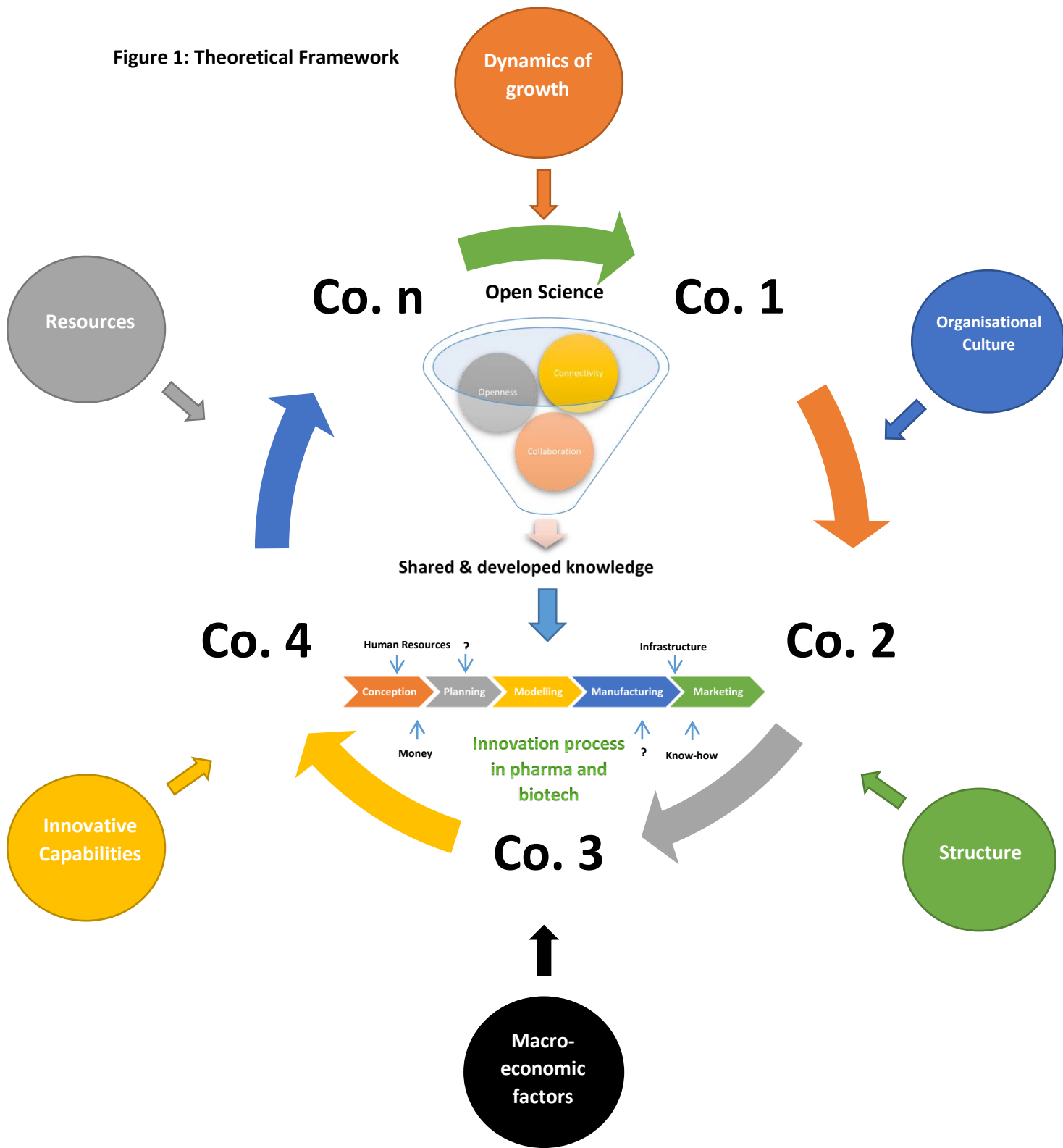
2.9 The Theoretical Framework

Given the foregoing analysis of the literature on innovation, innovation process, critical factors, and networking, figure 1 illustrates the connectivity of various constructs of innovation, networking, and open innovation as presented in prior research.

In the presented theoretical framework, the factors that impact innovation are shown in the coloured outer circles and include resources; such as financial and human, dynamics of growth, innovative capabilities and cultural aspects among other factors. Companies that are engaged in an innovation network are represented as Co.1, Co.2, until Co. n, and within their network they adopt open science, which depends on connectivity, openness and collaboration, and the implementation of innovation processes. Factors of human resources, know-how, infrastructure and money are illustrated as some of the identified factors to influence the innovation process. The coloured arrows connecting the companies on the framework refer to the direction of coordination and the connections that are established between collaborating companies while engaged in an innovation project.

A description of the connectivity is then presented in sections 2.8.1, 2.8.2, and 2.8.3 according to three themes that were identified from relevant literature on innovation enablers and challenges, innovation process and factors, and innovation and networking.

Figure 1: Theoretical Framework



2.9.1 Innovation Enablers and Challenges

Innovation existence and advancement are different between developed and developing countries. The literature indicates a link between innovation and the dynamics of growth and prevailing macro-economic factors (Tsvetkova et al., 2017; Sharma, 2018). In addition, the characteristics of innovative organisations are highly affected by the organisational culture. Moreover, the lack of financial resources and human capacity, lack of innovation structure, and capabilities are among the challenges facing conducting clinical trials in developing countries which are major steps of pharmaceutical innovation.

2.9.2 Innovation Process and Factors

Innovation in the pharmaceutical industry involves multiple sub-processes (Pavitt, 2005). The literature indicates that resources such as know-how, skills, infrastructure, and financial resources are crucial for pharmaceutical organisations to build competitive advantages (Derbyshire and Giovannetti, 2017). Human resource, in the form of strategic leadership and innovation champions, was emphasised by scholars (e.g., Hitt et al., 2010; Schilling, 2017) as one significant factor that reflects positively on the effectiveness of the innovation process. The success or failure of the innovation process can rarely depend on a single factor, but most probably is multi-factored.

2.9.3 Innovation and Networking

A connection between collaborative networking and innovation in the pharmaceutical sector was observed in the sense of providing external factors and resources that are essential to innovation but not readily available for innovative SMEs. In this context, fully integrated innovators that possess all the required resources and capabilities are declining and innovative organisations seek missing or additional resources and capabilities from external sources. Such efforts are usually faced with several obstacles that hinder the adequate acquisition and provision of such crucial elements to innovation. As a common form of networking, innovation is positively associated with the concept of Open Innovation (OI) (Chesbrough, 2003, 2006). In biotechnology, the concept of OI is pursued in the form of Open Science (OS); that is based on openness and connectivity and provides for sharing and developing knowledge and making it accessible (Porter et al., 2005).

CHAPTER 3 - RESEARCH METHODOLOGY

3.1 Overview

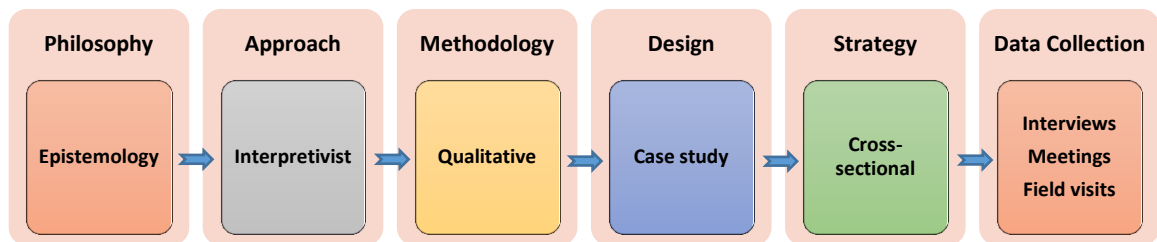
The research methodology addresses the main research questions, research aims, and the stated research objectives that pay attention to the innovation process, building innovative capabilities, and key innovation factors, among other constructs. These constructs were generated from a critical analysis of the literature on innovation enablers and challenges, innovation processes, and networking. The methodology comprised selecting five SMEs in the pharmaceutical sectors in the MEA to conduct case studies and semi-structured interviews with participants from these SMEs based on research documents. The research documents included a research information sheet, consent form, and data collection sheet that outlined the research objectives and the detailed research questions that were addressed during interviews with research participants. These documents can be found in Appendices 2, 3, and 4. As an additional source for data and information gathering, the researcher attended meetings and focus groups and reviewed documents and records that depicted the studied SMEs' approaches and practices concerning innovation. Following the fieldwork stage, case studies were developed, and the data and information related to each case study were analysed using cross-case analysis. The analysis outcomes were reviewed, amended, and tested in preparation for the development of research findings where answers to the research questions were presented.

3.2 Research Plan

This research is informed by Saunders et al.'s (2019) onion ring framework. The framework was used to develop a plan for this research in terms of the philosophy, approach, methodology, design, strategy, and data collection techniques. This plan starts with the epistemological research philosophy that is deemed suitable for the research topic related to innovation in SMEs in the pharmaceutical sector in the MEA region. The plan identifies the interpretivist research approach and the qualitative methodology for the research journey as both were considered appropriate for the research topic which focuses on the relation between innovation and networking in SMEs in the pharmaceutical sector in the MEA. Utilising such a research paradigm

assisted in gathering relevant information from the field through studying related practices and actions by SMEs in the pharmaceutical business to understand their innovation processes and bottlenecks. The research design is based on case studies that bring the researcher closer to the studied innovative SMEs and formulates cases that provide data and information that can be used to answer the research questions. The next step of the plan indicates the cross-sectional dimension as the strategy of the research and concludes with introducing the data collection techniques that comprise interviews, meetings, focus groups, and field visits. The research plan elements are depicted in figure 2 below and are explained in the following sections.

Figure 2: Research Plan



3.3 The Research Philosophy

The epistemological philosophy is chosen to explore research variables related to innovation and networking, e.g., organisations' innovation capabilities and resources and innovation critical factors, and their connections. This philosophy is deemed appropriate because of the assumed tentative connections between these interrelated variables and the need for different sources of acceptable and sound knowledge (Saunders et al., 2019). Furthermore, to address the stated research problem which concerns the challenges facing innovative SMEs in the pharmaceutical sector in the MEA region, the epistemological philosophy enables this research to utilise the power of inquiring and answering by reflecting on the research variables and confirming or replacing based on the identified relevance and connections between the variables (Hetherington, 2019). By adopting the epistemological philosophy, the opinions, expertise, and perspectives of the research participants who own and operate pharmaceutical SMEs in the MEA region were gathered and synthesised into a coherent framework thereby developing knowledge and beliefs pertaining to the research topic (Gerson, 2009; Hetherington, 2019). The researcher took a step further to reflect on the

value of the created knowledge on the SMEs that were studied and how it can be materialised and capitalised on to support innovative capabilities (Kvanvig, 2003).

The reason for following the epistemological philosophy against the ontological philosophy for this research is that the research topic stated as the impact of networking on innovation indicates the need to explore associations between the research variables including innovation, innovative capabilities, innovation process and factors, and networking, rather than seeking an existing reality of stable and established entities with identified properties (Gray, 2019). Accordingly, the researcher aimed to answer the research questions addressing these associations without previously identified ontological assumptions to focus on (Saunders et al., 2019). For example, the epistemological philosophy allowed answering the following research question: what are the main challenges and issues affecting the capabilities of innovative SMEs in the pharmaceutical industry in the MEA?

3.4 The Research Approach

This research adopted the interpretivist approach and the theoretical position of interactionism (Guba and Lincoln, 1994); enabling the researcher to observe and analyse the subjectivities of various stakeholders of the innovation process in SMEs in the pharmaceutical sector in the MEA region. This was performed to build a sensible understanding of how these stakeholders including business owners, board members, pharmaceutical managers, and researchers interacted with others in their social and business environments (Saunders et al., 2019). This approach allowed for the interaction between the researcher and various stakeholders involved in the innovation process in the SMEs that qualified for this research. It also allowed for a deeper assessment of their perspectives of the studied variables, e.g., organisations' innovation capabilities and resources and innovation critical factors, as they naturally co-exist/interact in the pharmaceutical sector rather than a single and objective perspective of innovation as a phenomenon (Guba and Lincoln, 1994; Gerson, 2009). The researcher studied the nature and form of these interactions to explore the relation between resources, capabilities, critical factors, and innovation capabilities to address the main aims of this research objectives, answer the research questions, and create knowledge through interacting

with the research participants (Guba and Lincoln, 1994). In particular, this approach catered for the research objective related to exploring the interplay between organisational setup and innovative capabilities of SMEs in the pharmaceutical industry in the MEA.

The research followed the theoretical perspectives that interpretivism embraces by adopting semi-structured interviewing, observation of participants, and study of documents related to innovation projects in the studied organisations to study the innovation process and analyse the critical factors affecting it (O'Donoghue, 2018). These inquiries helped to understand and re-construct the tentative connections between the interrelated variables, such as financial resources, human capital, know-how, infrastructure, and innovative capabilities, as identified in the literature review chapter of this research. In this context, the inquiries looked for commonality among the research participants who were able to construe the substance of the variables, while allowing the chance for new meanings and interpretation as information and sophistication increased through a dialectical process (Guba and Lincoln, 1994). However, the researcher realised the need to minimise his role as a facilitator in the inquiry process for the benefit of generating knowledge and consensus based on the competence and expertise of the participants (Carr and Kemmis, 1986). In this regard, participants who contributed to this research provided their feedback concerning the research questions based on their current roles, their previous experience, and their anticipated actions in different situations. In addition, input obtained from pharmaceutical managers was verified and cross-checked with information gathered from employees on different managerial levels who were involved in innovation-related activities. The verification and cross-checking processes were crucial to increase the validity of the information and input concerning the challenges hindering innovation in SMEs in the MEA and the factors that affect the innovation process, innovative capabilities, and success of networking. These processes also emphasised the inter-departmental collaborations within an organisation and how they relate to the studied variables including innovation process and factors and networking. In this context, the interpretivist approach allowed the researcher to generate meaningful interpretations

and understandings of the researched organisational environments in the pharmaceutical sector and their interactions that were reflected on presumed connections between identified innovation variables (Saunders et al., 2019).

Considering the nature of the research topic, which is related to innovation enablers and challenges in SMEs in the pharmaceutical business in the MEA, the researcher adopted the inductive bottom-up process that facilitated studying subjects as they naturally exist and allowed for developing a theory or building on an existing one with a richer perspective (Saunders et al., 2019). An inductive approach often starts with an area of research, and it allows the relevance of the research to emerge from the data collected from a small number of organisations and was meant to study the innovation-related activities that take place within the context of these organisations based on qualitative information gathered in alternative methods (Saunders et al., 2019). In this research, the inductive approach started with the identified research problem related to the challenges confronting innovative SMEs within the pharmaceutical sector in the MEA, developed an understanding of how this problem is addressed by pharmaceutical managers and professionals, and then allowed evidence to become visible from the data collected from interacting with those individuals. The inductive approach was implemented by observing experience-based practices and beliefs to better understand the research topic and propose explanations and reflection of observations through the interpretive theory (Kelemen and Rumens, 2008; Saunders et al., 2019).

The interviews that were conducted with pharmaceutical managers in this research enabled the researcher to understand the pharmaceutical managers' interpretations of the challenges they are confronted with in innovation. They also helped in understanding how innovations can be identified and developed and how managers perceived the impact of networking on innovation. In addition, the researcher had the chance to gather information about the logic behind the actions of participants (Wolcott, 1994; Miles and Huberman, 1994) and generate interesting findings about their interpretations of identified themes, such as suggesting support systems and incubation facilities as facets of networking. These interpretations that were generated from the research field, and were more relevant to the experience of participants, implied the

need to have a wider picture of research themes. On the one hand, some themes were identified from the literature review and on the other hand, there were different interpretations of research themes and variables by pharmaceutical managers during the interviews; together forming a more comprehensive illustration of themes. These were investigated through an abductive approach, enabling the researcher to reason and practice judgement to conclude how the identified innovation themes interact (Perry, 1998; Farquhar, 2012). Accordingly, inductive and deductive approaches were followed as linked approaches to be performed simultaneously and hardly separated or exclusive in this research (Perry, 1998; Gray, 2019). This selection was appropriate in the sense of allowing for enough room and flexibility to generate views and insights that were relevant to the research topic and based on the experience and practices of the interviewed participants. Such outcomes were instrumental in building a practical collaborative innovation model that can be used by SMEs in the pharmaceutical sector in the MEA to develop their innovative capabilities and mitigate innovation challenges.

3.5 Methodology

A qualitative methodology lends itself to an interpretive approach (Guba and Lincoln, 1984) where the researcher gets into details about the experiences the people who were interviewed lived and their social surroundings. Qualitative research was deemed appropriate as it allowed the researcher to take advantage of triangulation to generate rich descriptions of the social interactions that led to innovation in the chosen cases (Yin, 2018). By utilising qualitative research, the researcher was able to get closer to the research subject to produce concrete evidence as opposed to an abstract view that is obtained from quantitative research. Moreover, a qualitative methodology was chosen because it utilises several effective methods, e. g., interviews and focus groups, to address the research objectives and ensure the researcher learns about the studied pharmaceutical SMEs, observes the environment in which they operate, and understands the social world in which their managers and professionals live (Bryman, 2008; Ormston et al., 2014).

In addition, adopting a qualitative approach enabled the researcher to obtain practical input from pharmaceutical professionals and be in a better position to understand the

specific circumstances leading to innovation, networking, and strategic alliances. It also allowed the researcher to inquire in the natural setting (Yin, 2018) of innovative SMEs, collect information pertaining to different situations and stages of the innovation process, and identify the interpretations, meanings, and purposes pharmaceutical professionals attribute to their actions according to their subjective references (Guba and Lincoln, 1994; Williams, 2000; Denzin and Lincoln, 2008). Data obtained in this sort from qualitative research was a source of meaningful descriptions of the pharmaceutical industry in the MEA and how it differs from that in developed countries.

While conducting qualitative research, the researcher learned about the interpretation and opinions (Miles and Huberman, 1994) of pharmaceutical managers and professionals on the perceived actions within their organisational contexts towards innovation and networking. This type of data, after it was organised into coherent incidents and stories, was utilised to revise the tentative connections between the variables related to innovation and networking and develop a grounded theoretical framework with an interpretive approach (Miles and Huberman, 1994; Denzin and Lincoln, 2008).

In addition, a qualitative research approach was chosen because it enabled the researcher to pose questions flexibly and provide pharmaceutical managers with the opportunity to expand their answers and provide their insights on innovation beyond the boundaries of a quantitative survey making it easier for the researcher to interpret their answers (Mahoney and Goertz, 2006). Moreover, qualitative research was favoured because it provided more room for triangulation; where multiple tools of interviews with concerned staff, observation of the organisational environment, and review of related documents were used to study the innovation process and check the validity of outcomes of each approach (Eisenhardt, 1989; Bryman, 2008; Hussein, 2018).

By implementing the qualitative research, which is consistent with an interpretive approach and aligns well with adopting a case-oriented approach, the researcher worked closely and deeply in the natural settings and contexts of the studied SMEs in the pharmaceutical sector. This allowed the researcher to interpret and make sense of the meanings and expressions conveyed by pharmaceutical managers concerning

innovation enablers and challenges to make them visible by relating them to real-life examples and actual experiences (Denzin and Lincoln, 2011; Saunders et al., 2019). However, the researcher was mindful of the need to mitigate any bias resulting from his deep involvement in the studied SMEs and utilised triangulation for this purpose (Fusch et al., 2018).

3.6 Pilot Study

Before undertaking the main research, a pilot study was carried out to test and adjust the research protocol and ensure its adequacy, applicability, and effectiveness (Gray, 2004) in addressing the research objectives and questions pertaining to innovation enablers and challenges, innovation process, and networking. Before that, an initial scanning of the MEA region was performed to get a sense of appropriate pharmaceutical organisations that could be used for the study by identifying tentative relevance regarding the research topic; especially pertaining to previous experience in innovation and networking. This led the researcher to choose two SMEs that were selected according to the organisations' selection criteria shown in section 3.7.2 in this chapter to ensure similarity, relevance, and the existence of prevailing conditions that render a comparable environment surrounding the organisations selected for the research. The two SMEs were selected from two countries; Saudi Arabia and Jordan; where the researcher had established experience, contacts, and knowledge of the pharmaceutical industry and community and this selection was meant to prepare the researcher for conducting the research in different countries in the MEA. Moreover, Saudi Arabia has the largest pharmaceutical market in the MEA region and Jordan is considered as a pharmaceutical hub for its long experience in the pharmaceutical industry. The selection of these two countries was also intended to get the research tools tested in settings that meet the selection criteria and assess the ability of the research instruments to collect answers and feedback in a classified manner that can be analysed and evaluated later. In addition, the researcher utilised the pilot study to test the ability of the research tools to generate data and information that can be used to investigate and observe the main themes of the research, the perspectives highlighted by pharmaceutical managers, and the growing trends of thoughts about innovation and networking.

During the pilot study, a group of participants was interviewed and asked about how well they understood the questions, if they thought any amendments were needed to make them clearer, and if any questions needed to be merged or deleted. This was done as part of establishing effective tools and refining the investigative questions that were included in the data collection sheet. The feedback was collected and used to enhance the questions and a tool was developed to evaluate the investigative questions that were used to elaborate on the research questions. The tool used three assessment parameters of vagueness, need for further explanation with an example, and need for redirection. Vagueness indicates that the question was not understood from the first time, further explanation with an example indicates that the participant asked for an elaborative example, and the need for redirection indicates that the participant answered in a direction away from the question. The researcher suggested that when an investigative question answers (yes) to two or more of these parameters then it requires amendment. This tool is shown in table 3.

Table 3: Evaluation of the Research Investigative Questions

Research Investigative Questions	Assessment Parameters ¹			Amended Questions
	Vagueness ²	Further explanation with an example ³	Redirection was needed ⁴	
Theme 1: Innovation enablers and challenges in the pharmaceutical industry in the MEA				
How does innovation relate to dynamics of growth, macro-economic factors, resources, and capabilities?	Yes	Yes	Yes	What is the effect of dynamics of growth, macro-economic factors, resources, and capabilities on innovation?
How can SMEs in the pharmaceutical sector in the MEA realise their innovative capabilities and acquire essential skills?	Yes	Yes	No	How can SMEs in the pharmaceutical sector in the MEA recognise and utilise their innovative capabilities?
How can SMEs in the pharmaceutical sector in the MEA complement and enhance their innovation capabilities?	Yes	Yes	No	How can SMEs in the pharmaceutical sector in the MEA complete and develop their innovative capabilities?
Theme 2: Innovation process and factors				
How do SMEs secure these factors?	No	Yes	Yes	How do SMEs secure and provide these factors?
Theme 3: Innovation and networking				
How do the factors of innovation affect a collaborative innovation network?	Yes	Yes	No	Is the effect of innovation factors different if innovation is done by one organisation compared to a network?
What are the possible sources of conflicts in a collaborative network involving SMEs in the MEA and how can they be evaluated and avoided?	Yes	No	Yes	What are the possible sources of conflicts in a collaborative network involving SMEs in the MEA and how can they be avoided?
How can partners of a collaborative network of various levels of knowledge and economic superiority maintain their unique interests and control measures and avoid any compromises?	Yes	Yes	Yes	How can partners of a collaborative network of various levels of knowledge and economic superiority maintain their interests and control measures and identity and avoid any compromises?
How can SMEs in developing countries benefit from open science opportunities?	Yes	Yes	Yes	Can open innovation and open science be applicable to SMEs in the MEA and how can they benefit from them?
How do SMEs ensure the readiness, sufficiency, and optimisation of factors that are essential to commercialise innovation?	Yes	Yes	No	How do SMEs ensure the readiness and sufficiency of these factors?

Key: 1: Assessment parameters: if any question scores 2 or more (yes) then it requires amendment. 2: Vagueness: the question was not understood the first time. 3: Further explanation with an example: the participant asked for an elaborative example. 4: Redirection was needed: the participant answered in a direction away from the question.

(Source: Researcher's Ideas)

3.7 The Research Design

3.7.1 Case Study

The researcher adopted the principles of a case study strategy which allows for exploratory research and aligns well with qualitative research (Stoecker, 1991). Yin's definition of a case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context" (Yin, 2009, p. 18) justifies the use of such a strategy for this research. This is because a case study provides rich insights into the dynamics of innovation and investigates the role and impact of networking on innovation in the evolving pharmaceutical industry through field studies of collaborative networks in this sector. The case study approach was instrumental in this research as it enabled the researcher to address the research questions comprising investigating how innovative ideas can be identified, incubated, and developed from conception to successful commercialisation and how networking impacts innovation; where case studies were favoured for answering how questions (Farquhar, 2012; Yin, 2018). Moreover, the case study strategy provided a holistic view of the characteristics of real-life situations pertaining to how individuals and organisations approached the challenges and solutions concerning innovation and networking (Yin, 2018). In addition, the case study approach was applied to address and interpret the dynamics within isolated settings; the innovative SMEs in this case, and how they relate to the dynamic innovation process (Eisenhardt, 1989; Leonard-Barton, 1990).

For this research on the impact of networking on innovation, adopting a case study approach enabled the researcher to build a mid-range theory (Eisenhardt, 1989; Ridder et al., 2014) focusing on a less understood context of the interactions between critical innovation factors, innovation process, and networking in SMEs in the pharmaceutical sector in the MEA. In addition, this approach allowed the researcher to guide the data and information collection and analysis and generate findings that were verified by triangulation (Stoecker, 1991; Creswell and Poth, 2017; Yin, 2018). The types of triangulations used in this research were the data source triangulation; interviewing pharmaceutical managers from different organisations and different innovation-related functions, and methods triangulation; including interviews, field notes, and observation of actions, which were adequate to support the validity of the evaluation of the case

studies as more than a single source of evidence (Donmoyer, 2000; Yin, 2013; Carter et al., 2014).

Case study-oriented research was perceived to provide a solid base for inquiring about the development of innovation in the studied SMEs and the necessary in-depth field investigation to answer the research questions and achieve its objectives (Héroux, 2018). In particular, the case study research enabled the researcher to achieve the objective pertaining to evaluating the role of networking in developing the innovative capabilities of SMEs in the pharmaceutical industry in the MEA. Each case study was established on similar and comparable assumptions, circumstances, and conditions and findings were integrated to provide the anticipated and informative outcomes. Some of the similar aspects considered included the existence of a mature R&D function and the previous history of registering patents as explained in the selection criteria in section 3.7.2.

The researcher adopted purposive sampling and used his judgement based on his knowledge and experience in working in the pharmaceutical sector in the MEA region in identifying SMEs that have relevant exposure to innovation projects and employ professionals who were exposed to innovation and networking ventures. This selection resulted in informative case studies that enabled achieving the research objectives, answering its questions, and highlighting the connections between the research variables (Yin, 2018; Saunders et al., 2019). Purposive sampling was deemed appropriate for this study as it helped the researcher to build a deeper understanding of how pharmaceutical SMEs in the MEA region set up their operations to maximise innovation in drug discovery and development (Farquhar, 2012). For qualitative research, purposive sampling yields a sample that is tailored to the research and hence produces predictable cases that can generate comparable results and a level of variety and chances for intensive and informative research (Stake, 2013). With this technique, subjective judgement was used to assure the selection of SMEs that were suitable bases for comprehensive and information-rich case studies to address the research objectives and questions pertaining to innovation and networking (Saunders et al., 2019). Among various purposive sampling strategies, the homogeneous sampling technique was used in this research because it allowed for the selection of a group of similar SMEs with

comparable characteristics that were established to identify entities that were perceived to address the main research problem related to the issues and challenges facing innovative SMEs in the pharmaceutical sector in the MEA (Saunders et al., 2019). The process of building theory from case study research (Eisenhardt, 1989) was followed in this research, starting with generating the research questions, identifying pilot case studies, designing data collection instruments, conducting field research, and analysing data. The unit of analysis for the case studies was small and medium (SM) organisations in the pharmaceutical sector in the MEA that satisfied at least five elements of the selection criteria that are explained in section 3.7.2 (selection criteria). In addition, the selected organisation had to encounter the research problem in order to investigate the actions taken by the organisation to mitigate the innovation challenges and assess the impact of networking on developing innovative capabilities to generate a theory from the evidence collected from the case study (Eisenhardt, 1989).

3.7.2 Selection Criteria

The selection criteria in this research have three folds; the selection of countries within the MEA, the selection of SMEs in the selected countries for conducting case studies, and the selection of participants from the selected SMEs for conducting interviews. The researcher selected the participating SMEs from countries that were export-oriented, considered hubs for pharmaceutical projects in the MEA, contributed significantly to the MEA pharmaceutical markets in terms of value and volume, or were sources for exporting technology and competent pharmaceutical professionals. These criteria are illustrated in table 4 with their justifications.

Due to the absence of consistent criteria for identifying SMEs in different countries in the MEA region (Hertog, 2010), the researcher adopted the criteria established by the European Union as per EU recommendation 2003/361; which specifies the upper limit for the number of employees at 250 and the turnover limit to be equal or less than 50 M Euros for an SME (European Union Commission, 2003). The studied organisations were selected from countries in the MEA region as the boundary for this research to add regional and international dimensions to the study and hence a more convincing outcome of the research. This identified boundary provided the opportunity to analyse

the effect of local, social and cultural aspects within the MEA region on the research outcomes and reflected on a new innovation framework by taking into account geographical distinguishing factors making it a model that is applicable locally and regionally. Emphasis was towards how such aspects affected networking and collaboration success or failure in relation to supporting the innovation process. In addition to encountering the research problem, each organisation that participated in this research was selected based on satisfying the selection criteria pertaining to organisation's size, turnover, age, markets coverage, the existence of an R&D function, and patents as explained in table 5, which provides a full list of the criteria for qualifying organisations that were considered for case studies. The process for selecting SMEs for the research followed a systematic approach that considered the criteria and the indicated reference or justification for each criterion as shown in table 5. Based on this selection, the researcher anticipated observing similar patterns, trends, and approaches towards the research themes and variables. The selection of participants from the selected SMEs was based on the roles and relevance to the studied themes of innovation challenges, innovation process and factors, and networking. They needed to assume functions of executive management, operations, technical, R&D, regulatory affairs, business development, marketing, sales, quality assurance, supply chain, finance, and other related functions. Managers and professionals who participated in the research were selected according to their level of experience and ability to provide rich insights on innovation and networking. They also needed to hold supervisory roles and be assigned managerial and technical duties and responsibilities related to their functions. This selection was meant to ensure obtaining informative input as such employees were usually involved in decision making and managing issues and matters related to innovation and networking, hence becoming informed and able to provide insightful input towards the sought data and information. Table 6 illustrates the participants' selection criteria with justifications and table 9 illustrates a full list of the participants who were interviewed in this research with information related to their qualifications, job roles, and their total years of experience.

Table 4: Countries' Selection Criteria

Characteristics of the country	Criteria	Justification
Geographical boundary	Inside the MEA region.	Relevance to the research topic.
Markets coverage	Export-oriented.	Extended exposure
The concentration of the industry	Pharmaceutical hub.	Extended and proven experience.
Concentration of manpower	Source of a competent workforce.	Relevance to the research topic.

(Source: Researcher's Ideas)**Table 5: Organisations' Selection Criteria**

Characteristics of the organisation	Criteria	Reference/justification
Geographical boundary	Inside the MEA region.	Relevance to the research topic.
Size in terms of manpower	Less than 250.	EU recommendation 2003/361
Size in terms of turnover	Less than 50 M Euros.	EU recommendation 2003/361
Number of years since the establishment	More than 10 years.	Established operation.
Markets coverage	Local (L), regional (R), and international (I).	Extended exposure.
Research and development function	Exists internally and is mature.	Relevance to the research topic.
Patents	Availability of registered or filed patents.	Relevance to the research topic.

(Source: EU and Researcher's Ideas)**Table 6: Participants' Selection Criteria**

Characteristics of the participant	Criteria	Justification
Function and role	Relevant to research topic and themes.	Ability to provide informed feedback.
Years of experience	More than 7 years.	Ability to provide rich insights based on experience.
Managerial level	Holding managerial or supervisory roles.	Exposure to internal and external relations and decision-making.

(Source: Researcher's Ideas)

The selection criteria shown in tables 4 and 5 have guided the researcher to select the organisations shown in table 7 for conducting the case studies this research was based on.

Table 7: Organisations Participating in the Research

Organisation	CS1	CS2	CS3	CS4	CS5
Country	Saudi Arabia	Jordan	Jordan	Jordan	Egypt
Manpower	250	245	124	230	250
Turnover	< €50 M	< €50 M	< €50 M	< €50 M	< €50 M
Establishment	20 years	31 years	21 years	27 years	11 years
Market coverage	L, R, I	L, R, I	L, R, I	L, R, I	L, R, I
R&D function	Available	Available	Available	Available	Available
Patents	No	No	No	No	No

3.8 Data Collection

3.8.1 Interviews

Semi-structured interviews were used with participants in this research because they enabled the interviewees to elaborate on the issues and challenges they are confronted with throughout the innovation process and suggest how they can be eliminated from their perspectives as thinkers and observers (Gerson, 2009). Such interviews also allowed for flexibility in discussing critical innovation factors and how networking can develop innovative capabilities. In addition, by preparing a set of investigative questions, semi-structured interviews helped the researcher to discuss the identified research themes of innovation enablers and challenges, innovation process, and networking and identify new themes or highlight important aspects according to the flow of the interview in a conversational way (Longhurst, 2003; Saunders et al., 2019). The time spent with participants during these interviews allowed for inquiring about their interpretations, insights, and perceptions related to the research variables and their interrelations and about their suggestions for other sources of relevant information (Yin, 2018). The interviews were conducted with the selected participants and their insights and views on innovation and networking were supported through triangulation and comparison with input from other participants, based on which understandings were built (Saunders et al., 2019).

Interviews were conducted face-to-face or virtually, were recorded, transcribed, and sent back to the participants for verification. Interviews were conducted in English and Arabic but were all transcribed in English and confirmed with participants. To avoid losing any meanings or expressions in translation, the researcher cross-checked several

related quotes to ensure the expressions and ideas of the participants were unified and maintained. The duration of the interviews varied between 45 minutes and four hours depending on how participants expanded their answers to the questions raised and the researcher made sure to give ample time to allow the participants to express their perspectives and opinions freely.




The data collection for this research commenced by identifying five organisations that fall under the category of SMEs in the pharmaceutical sector in the MEA region. The researcher chose a sample of five organisations because if the number is less than four it will be hard to develop a theory and the empirical case will be unconvincing, while a number more than ten will generate complex data that is hard to cope with (Eisenhardt, 1989). A group of six research participants from different managerial levels and functions in each of the researched SMEs was selected to dig vertically into the organisation and obtain information from several levels and views (Leonard-Barton, 1990), bringing the total number of interviews to 30. Data collection was obtained through semi-structured interviews that were based on an interview guide that included investigative questions on the research predetermined themes of innovation enablers and challenges, innovation process, and networking to assist in guiding the interview and organising the flow of information and opinions (Saunders et al., 2019). Furthermore, the researcher investigated how innovation progresses by observing the innovation process on the ground within the environment of the studied SMEs. In addition, various documents related to the innovation process, such as policies, manuals, procedures, and meeting records, were examined to gather relevant information.

Table 9 illustrates some basic information about the interviewees who participated in this research and the coding that will be used to refer to the input or quotes related to each interviewee. The coding used is based on the country, organisation, and sequence of each interviewee in the group of interviews conducted in their organisation. Table 8 shows an illustration of the coding used.

Table 8: Coding System for Interviewees

Coding	Country	Organisation	Interviewee
SA-CS1-1	Saudi Arabia	CS1	1
JO-CS2-3	Jordan	CS2	3
JO-CS3-5	Jordan	CS3	5
JO-CS4-1	Jordan	CS4	1
EG-CS5-5	Egypt	CS5	5

Table 9: List of Research Participants

Country	SME	Participant no.	Qualification	Title	Years of experience	Code
Saudi Arabia 	CS1	Participant 1	BSc/MSc in Pharmacy	Chief Operations Officer	24	SA-CS1-1
		Participant 2	PhD in Pharmacy	Formulation Manager	16	SA-CS1-2
		Participant 3	BSc/MSc in Pharmacy	R&D Manager	15	SA-CS1-3
		Participant 4	BSc/MSc in Pharmacy	Manager of QA	21	SA-CS1-4
		Participant 5	BSc Pharmacy	Technical Director	20	SA-CS1-5
		Participant 6	BSc Pharmacy/MBA	Supply Chain Manager	15	SA-CS1-6
Jordan 	CS2	Participant 1	BSc Pharmacy/MBA	General Manager	21	JO-CS2-1
		Participant 2	BSc/MSc in Pharmacy	Technical Director	23	JO-CS2-2
		Participant 3	MBA/Finance	Deputy General Manager	15	JO-CS2-3
		Participant 4	BSc Pharmacy/BA Law	Sales & Marketing Director	20	JO-CS2-4
		Participant 5	BSc Chemical Eng/MBA	Supply Chain Manager	10	JO-CS2-5
		Participant 6	BSc Pharmacy	Regulatory Affairs Manager	8	JO-CS2-6
	CS3	Participant 1	BSc Pharmacy	General Manager	23	JO-CS3-1
		Participant 2	B. Sc. Chemical Eng	Procurement Manager	17	JO-CS3-2
		Participant 3	BA in Accounting/MBA	Finance & Admin Manager	15	JO-CS3-3
		Participant 4	PhD in Pharmacy	Technical Consultant	30	JO-CS3-4
		Participant 5	BSc Pharmaceutical /BA	Technical & RA Manager	15	JO-CS3-5
		Participant 6	BSc Pharmacy / MSc BA	R&D Manager	32	JO-CS3-6
	CS4	Participant 1	BSc in Pharmacy	Managing Director	37	JO-CS4-1
		Participant 2	BSc in Pharm. D	Business Dev. Manager	10	JO-CS4-2
		Participant 3	BSc in Pharmacy	Board Member	40	JO-CS4-3
		Participant 4	PhD in Pharmacy	R&D Consultant	23	JO-CS4-4
		Participant 5	BSc Industrial Eng.	Production Planning Head	8	JO-CS4-5
		Participant 6	BSc in Pharmacy	R&D Director	21	JO-CS4-6
Egypt 	CS5	Participant 1	BSc in Pharmacy	Managing Director	44	EG-CS5-1
		Participant 2	B. Sc. Vet. Med./MBA	Regulatory Affairs Manager	20	EG-CS5-2
		Participant 3	B. Sc. Vet. Med.	National Sales Manager	26	EG-CS5-3
		Participant 4	BSc in Pharmacy	Procurement Manager	17	EG-CS5-4
		Participant 5	BSc in Pharmacy	Formulation Head	9	EG-CS5-5
		Participant 6	BSc in Pharmacy	Plant Manager	20	EG-CS5-6

(Source: Researcher's Ideas)

3.8.2 Artefacts

The researcher collected data by observing pharmaceutical managers, conducting in-depth interviews for enquiry, and examining relevant documents and materials, such as

minutes of meetings, companies' annual statements and reports, and project documents and plans, thus providing several references for evidence (Leonard-Barton, 1990; Wolcott, 1994). For each case study that was conducted in this research, the researcher examined at least one sample of the documents that illustrate the relation between the collaborating parties or the correspondence with innovation project stakeholders. The researcher also participated in periodical meetings related to innovation and monitored how subjects, issues, and decisions were handled and made. This participation was useful to learn how some SMEs were encouraging employees from different managerial levels to contribute to their organisations' innovative efforts with their input and ideas. The time that the researcher spent in the studied SMEs allowed for understanding what was happening in those organisations, observing how the staff, in general, operates in normal situations related to innovation projects, and learning from the outcomes without any presumptions (Farquhar, 2012; Stake, 1995).

3.9 Cross-sectional Research Technique

The cross-sectional technique was deemed appropriate for this research because it allowed the researcher to observe and describe the innovation as a phenomenon and the behaviour of innovation factors in terms of relative importance, substitution, and criticality and their interactions at a given time. In addition, this dimension allowed studying how different organisations observed and dealt with the studied phenomenon and factors (Saunders et al., 2019). Furthermore, cross-sectional research was favoured because it lends itself to qualitative research that is utilising interviews and for its ability to provide a snapshot of pharmaceutical managers' perceptions of the research variables at a certain point in time (Gray, 2019). This provided the researcher with the opportunity to build rich insights in a focused time interval into the processes these managers undertake to develop innovations from conception till commercialisation and capitalise on this understanding to answer the research questions. In addition, this dimension provided a comprehensive overview of how organisations handle an innovation project or benefit from collaborative innovation networks in developing their innovative capabilities.

3.10 Data Analysis

Data and information collected from case studies and resulting from interviews, meetings, and documents review were recorded and documented via data collection sheets and other appropriate means like data mapping forms. The researcher linked the findings from the documents that were examined and the observations from the attended meetings to the input provided by the participants and inquired about them during interviews. The data and information were chronologically arranged and tabulated according to the research themes and a coding structure was formulated as per Appendix 1 to facilitate their analysis. The researcher used soft and hard copies to store the data and retained them in a secure place as per the university requirements for doing primary fieldwork and dealing with such data.

Within-case and cross-case analyses were used to analyse the collected data and information from separate case studies, compare and differentiate between cases, and generate new information and knowledge (Khan and VanWynsberghe, 2008). This type of analysis that moves between case studies supports the identification of patterns and commonality; based on which sense and meanings can emerge (Flick, 2013). The cross-case analysis supports generalisability by supporting the relevance and applicability of case outcomes to other comparable settings that are properly sampled (Miles and Huberman, 1994). In addition, this type of analysis strengthened understanding, reasoning, and explanation of multiple settings at the same time and studying a topic well (Miles and Huberman, 1994). For each case and across cases, the innovation constructs and networking effects were analysed. According to the replication logic (Eisenhardt, 1989), comparisons across various cases which represent different situations confirmed emergent relationships between constructs and thereby improved the validity of the relationship. When case findings disconfirmed a relationship, it provided an opportunity to refine and adjust a theoretical framework.

The researcher compared findings against the tentative connections between variables as per the outcomes of the literature review chapter of this research. This comparison resulted in suggesting new or amended connections based on the findings of the research and in line with the research questions. The next step was to conceptualise the

findings and draw preliminary connections between the research variables in a proposed model for collaborative networking. This was reviewed, tested, and amended through an iterative process that considered the research objectives and covered fieldwork, interview transcripts, and relevant literature. The outcomes of the data analysis phase formulated the results and findings of the research, based on which conclusions were drawn and a final model for collaborative networking was presented.

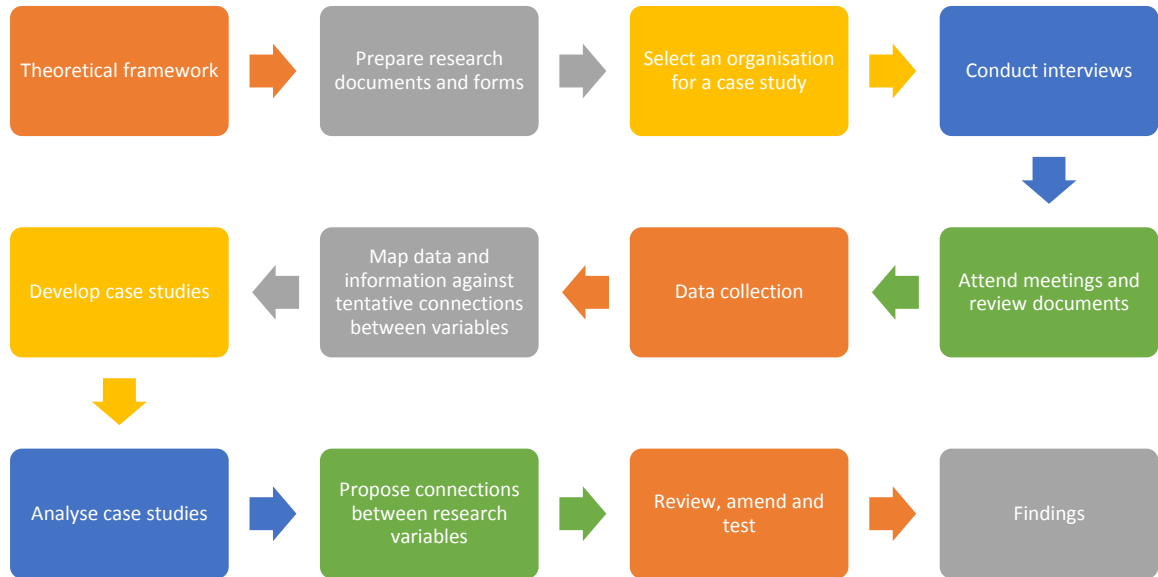
3.11 Generalisation

Case studies facilitate deep analysis but limit the general applicability of findings (Dana et al., 2019). Against that backdrop, generalisation from case study research can be achieved through analytical generalisation; where an abstract level of concepts and ideas is derived from the findings of the case study and associated with new situations in other contexts in a broader theory or constructs (Donmoyer, 2000; Polit and Beck, 2010; Yin, 2013). This form of generalisation builds on the conceptual background identified from reviewing extant literature related to innovation in the pharmaceutical industry and collaborative innovation networks and then associates the findings from case studies with new knowledge and concepts that are relevant to similar situations through analytical generalisability (Mookherji and LaFond, 2013; Yin, 2013). In this context, the researcher anticipates generalisation that is based on the data and information gathered about innovation in SMEs in the pharmaceutical sector in the MEA region in the form of an integrated model for collaborative networking that can be tested in other similar settings, such as other developing or emerging economies. This way of generalisation fits qualitative research by consistently applying an identified conceptual framework and transferring findings through an analytical ground of generalisation that addresses the contextual applicability (Byrne, 2013; Mookherji and LaFond, 2013). However, this form of generalisation would still need further study and comparison of fit between source and target cases for a stronger generalisation, such as in larger pharmaceutical organisations, at different phases of the innovation process, and in collaborative networks of different actors in terms of development and advancement (Gomm et al., 2000; Yin, 2013).

3.12 Summary

The methodology described in this chapter was designed to ensure that the right procedures were followed and that they were aligned to the research methods comprising qualitative research and case studies. This methodology started from the tentative theoretical framework that resulted from the literature review chapter and was followed by preparing the research documents and forms that included a research information sheet, a consent form, and a data collection sheet. The next step was selecting organisations to conduct case studies based on established selection criteria. The following step was to select six participants from the selected organisation's employees from various managerial levels, and from functions that are related to innovation, to conduct semi-structured interviews based on the research documents and forms. As an additional source for data and information gathering, the researcher attended meetings and focus groups and reviewed documents and records that depicted the organisation's approach and practices concerning innovation. Relevant data and information were collected from these activities and were mapped and tabulated against the tentative connections between research variables. Following the fieldwork stage, case studies were developed, and each case study included describing the case as explained by the organisation's participants and as observed by the researcher and highlighting the relevance to the research topic and objectives pertaining to innovation and networking. The data and information related to each case study were analysed using cross-case analysis and the outcomes were studied in comparison to the tentative connections between research variables. These outcomes were reviewed, amended, and tested in preparation for the development of research findings where answers to the research questions were presented and a new collaborative innovation framework was suggested. Figure 3 depicts this methodology.

Figure 3: A Summary of Research Methodology



3.13 Ethical Compliance

This research abides by the codes of research ethics that are applicable at Nottingham Trent University and other relevant codes that are related to the field of research, such as ethical issues pertaining to the pharmaceutical industry. Data creation, collection, and interpretation were conducted in line with the university's guidelines, methods, and principles (Bellamy and Perri, 2009). Moreover, the nature of the research main topic has entailed access to information and data pertaining to various stages of research and innovation activities, which were considered by most organisations as confidential and classified information. Accordingly, the adopted research methodology ensured that obtained information was used in a way that doesn't reveal any secrets or confidential information, whether directly or indirectly, to protect the rights and interests of participating organisations. Organisations that participated in the research; where the case studies were conducted, were fully informed of the objectives of the research, the research methodology, and the anticipated outcomes. These organisations were given the option to be anonymous or identified and were allowed to review information and inputs received from their side. None of the five organisations that participated in this research has requested to be anonymous.

Individuals participating in the research from the involved organisations were considered as representing their functional roles at their organisations and not as individuals in their capacities and permissions were obtained from their employers before participation. The gathered information from organisations or individuals was classified, analysed, and interpreted in a manner that doesn't cause any harm, loss, interruption, or negative impact to the participating organisations or individuals. All findings, propositions, and conclusions were based on factual and real information and were clearly and properly referenced to the source of information as per the research methodology explained earlier.

Before conducting any research work, this research methodology was subjected to ethical review following the guidelines specified by Nottingham Trent University Research Ethics Committee and was approved for conduct. A detailed ethical approval form was filled out by the researcher and reviewed with the lead research supervisor before submission to the ethics committee. In addition to the form, the research documents and forms, e.g. research information sheet, consent form, data collection sheet, and a summary of the research methods, were sent with the ethical approval form for consideration. The ethical review included aspects related to the research instruments, confidentiality, security and retention of research data, informing participants about the research and obtaining their consent, and risk of harm to researchers, individual participants, and participating organisations. The ethical considerations have also addressed online and internet research and any risks that arise specifically from the use of electronic media. Aspects related to internet site security and avoiding access to inappropriate sites that may cause harm or distress to research participants have all been considered and mitigated. In addition, appropriate guidance documents related to Staff and Students General Guidelines, Informed Consent and Online Research were read and complied with as part of the ethical approval process.

All the requirements and conditions towards securing ethical approval for this research were fully met and satisfied and accordingly approval was granted to start the research. The researcher explained to each participant before the start of any interview that this research has obtained the necessary ethical approval and what it entailed, and included

this explanation in the research information sheet. The participants were also informed about the possibility to elect not to answer any of the research questions or withdraw their input from the research; whether partially or fully, at any point in time before the final submission of this document and the way for doing so. The researcher assured participants that in case they decide to withdraw they will not be asked for any justifications or persuaded to change their decisions. Until the date of submitting this document, none of the participants has elected to do so. Identities of participants in this research remained anonymous during all stages of the research and their identities, or any signs that might indicate their identities were not included in any of the research documents.

CHAPTER 4 - FINDINGS

4.1 Overview

This section includes the results of the case studies that were conducted in the five pharmaceutical organisations that participated in this research. Each case includes a depiction of the chronological events that correspond to a case related to innovation and networking that was undertaken by the studied organisation and a detailed description of the case. The researcher studied and analysed each case and reflected on the themes of the research to identify similarities between the studied organisations regarding the research variables. Table 10 illustrates basic information related to the organisations where case studies were conducted for this research.

Table 10: Information about SMEs Participating in the Research

Item SME	Main fields of business	Main therapeutic areas	Number of products	Ownership structure
CS1	Pharmaceuticals, cosmetics, and healthcare products.	Dermatology, oral lines, disinfectants, and solutions.	300 SKU ¹	Limited liability company.
CS2	Pharmaceuticals, medical devices, cosmetics, and food supplements.	Ophthalmic, ENT ² , paediatrics, and dermatology.	140 SKU	Private shareholding company.
CS3	General anti-biotic, anti-hypertension, diabetes, CNS ³ , semi-solid, ovules, suppositories, and syrups.	Gynaecology, GIT ⁴ , anti-inflammatory, and hormones.	124 SKU	Private shareholding company.
CS4	Solid, semisolid and liquid dosage forms of branded generic pharmaceutical products.	Allergies, CVS ⁵ , Dermatology, vitamins and supplements, GIT, Infectious Disease, pain and inflammation.	56 SKU	Public Liability Company.
CS5	Branded generics, OTC ⁶ and food supplements.	Neurology, Psychiatry, Cardiovascular, Orthopaedics, GIT, Paediatrics, Urology, and Dermatology.	75 SKU	Private shareholding company.

Key: 1: SKU: Stock Keeping Unit, 2: ENT: Ear, Nose, and Throat, 3: CNS: Central Nervous System, 4: GIT: Gastrointestinal Tract, 5: CVS: Cardiovascular, 6: OTC: Over The Counter.

4.2 Case Findings

The following section includes the detailed results of the case studies conducted in each of the organisations that participated in this research.

4.2.1. Case Study 1 (CS1)

Main fields of business	Pharmaceuticals, cosmetics, and healthcare products
Main therapeutic areas	Dermatology, oral lines, disinfectants, and solutions
Number of products	300 SKU
Ownership structure	Limited liability company

4.2.1.1 Company Overview

CS1 was established in 1998 in Saudi Arabia as a private company specialised in the development, manufacturing, and marketing of health and beauty products and generic prescription medicines. Since its inception, and as indicated by the company's chairman and CEO on its website, CS1 was committed to ambitious innovation, significant investment, and immense growth to become a key player in dermatology in the region. CS1's chairman and CEO's enthusiasm towards achieving these goals was not coupled with the necessary preparation steps to ensure the company had identified its objectives, put a clear plan to achieve them, and identified the proper partners to network with for this purpose.

As part of its endeavour to establish development plans, the company hired a new general manager early in 2017 with a different blend of experience and exposure, including international networking, in anticipation of taking the company to new lines of business and areas of operation. The new general manager made a major shift in the company's future direction by convincing the board of directors of an innovative project based on bio-similars range of products as a thing of the near future. The general manager established a collaboration network for this project by appointing an external foreign consulting company to manage the project based on its perceived experience in similar fields. The decision was made to save development time, acquire the know-how of developing such new molecules, and allow its staff to be exposed to external entities that are experienced and specialised in the development of such new molecules.

The appointed consulting company nominated an Asian company to join the network since it owned a bio-similar product that can be exported as a semi-finished product that can be finally packaged with secondary packaging in CS1. This is a workable model in Saudi Arabia and can be put on a fast track for registration provided the company establishes a comprehensive plan regarding importation, secondary packaging, distribution, technology transfer, and local manufacturing within a definite period. CS1 had realised that such a project would require a significant investment that can be obtained by applying for financial support from local government funding entities that are mandated to support innovative projects. However, such funding is normally directed towards local companies only, so having foreign shareholders would create an obstacle to being eligible for funding. In a step to reflect the company's commitment to the innovative project, the local majority shareholders decided to acquire the shares of the non-local partners and the company became fully owned by local shareholders. CS1 started approaching the funding entities and asked for the steps and requirements to apply for funding. According to relevant meeting minutes and tracking sheets, CS1 board started to observe the slow progress, loss of clarity, and weak communication with the project network. Participant SA-CS1-1 stressed that this had created a gap that raised many concerns and worries, to which the company reacted by appointing another consultant to investigate the whole project and provide an independent evaluation report. The results of the investigation were surprising to CS1's board as they revealed that the Asian company had not registered its bio-similar product in Europe due to major non-compliance to regulatory requirements, lack of essential information and data, and failure to meet basic registration requirements. At that stage, the board decided to discontinue the network and stop the project due to the following reasons:

- The funding entities that were contacted received verbal and limited information about CS1's project and plans and never received a solid project proposal that meets the funding criteria
- The internal staff of CS1 had no information about the project and the stage it reached as it was completely managed by external parties in direct coordination

with the company's general manager and internal project ownership was not established.

- The general manager left the company without proper information handover regarding the project
- No technical due diligence was performed on any of the external parties that were involved in the project

According to participant SA-CS1-1, this unsuccessful experience created a psychological rejection that built up in the organisation on the higher management level. This made the company extra cautious, less inclined towards approaching any innovative ideas, and more interested in conventional generic pharmaceutical products. In addition, this experience created an unpleasant atmosphere of suspicion and exchange of accusations and blames, nothing of which was investigated nor confirmed.

4.2.1.2 Chronological Events of the Case Study

The following table illustrates chronological events that summarise CS1's case study.

Year	Important events
1998	CS1 was established.
2000-2017	CS1 pursued investment and growth plans.
2/2017	A new foreign general manager with experience in international networking was appointed.
4/2017	The general manager initiated an innovative project in research and development that was based on a strategic alliance with external parties to add a bio-similar product (a generic copy of a biological product) to the company's portfolio and acquire know-how through performing a technology transfer to manufacture it in CS1 in the future.
6/2017	CS1's board of directors decided to change its ownership structure by acquiring the shares of the minority non-local partners to transfer the company to a 100% local company and accordingly be eligible for external funding offered by governmental entities to local companies to secure enough funding for the anticipated innovation project.

6/2017	Local investors joined the company through an increase of capital to be allocated for research and development and innovation projects.
6/2017	An external consulting company was appointed to execute the project and perform the needed technology transfer for 1 M USD.
7/2017	The consulting company identified an Asian company that owns a bio-similar product that can be exported as a semi-finished product that can be finally packaged in CS1. The three parties formed a collaboration network together for the development of the project.
9/2017	CS1 initiated talks with governmental funding entities to secure the necessary financial resources to perform technology transfer to enhance innovative capabilities and establish a bio-similar manufacturing facility.
11/2017	CS1 management started to notice the slow progress in the project within its network and decided to appoint another consultant for 200 K USD to review and assess the project and how it can be fully executed.
1/2018	The consultant found out that the Asian company had not registered its bio-similar product in Europe because basic registration requirements were not met, which made it very challenging to move the project forward.
3/2018	The project was called off and the network was discontinued.
3/2018	The general manager left the company.

4.2.1.3 Challenges to Innovation

CS1 realised that acquiring the required know-how for the innovation project and creating knowledge as a core function in the organisation are crucial factors that have a significant effect on the innovation process (Rothwell, 1994; Powell, 1996). Accordingly, the company's innovation strategies were based on acquiring bio-similars development know-how through technology transfer. In this regard, CS1 was confronted with the major challenge of acquiring the know-how that was essential to their project due to the nature of bio-similars as a new field in the pharmaceutical industry, particularly in the MEA region. The company was able to gather limited information regarding bio-similars and what they entail; for example, registration requirements, before entering the

partnership with its network actors. In addition, it was clear to CS1 that substantial investment was needed for the project and the company was serious and determined about it to the point of making a significant change to the ownership structure to be eligible for external governmental funding. To CS1's management, this was an indication that lack of financial resources is among the challenges facing innovation in developing countries (Alemayehu et al., 2018).

4.2.1.4 Innovation Factors

In CS1's case, the human factor had an adverse effect on the innovation project starting with the decision to assign strategic and crucial decisions to one person who was newly appointed and had the highest executive authority in the company. This is in line with the emphasis made by some scholars on the role of the human factor, in the form of strategic leadership, as one significant enabler of the innovation process (Schilling, 2017). The selected partners by the general manager to form a collaborative network to work on the project were not up to the requirements and have collectively caused the project to fail. This example highlights the importance of the proper selection of the strategic leadership of any innovation project because it can be one of the reasons for the interruption of the project. Research evidence suggests that aspects related to prior experience, an established business network of relevant professionals, and sound selection criteria for partners can be some of the qualifications to mitigate this risk. Another issue related to the impact of the human factor on the innovation process is the involvement of sufficient internal resources and creating ownership among the company's team to establish organisational knowledge and information sharing that would ensure innovation continuity (Radaelli et al., 2011).

4.2.1.5 Innovation and Networking

During the innovation project, the company had poor feedback and updates within its collaborative network and suffered from inadequate communication resulting in insufficient information about the project's progress. It was only at this stage that the company started mistrusting its partners and checking on their history to find out that they never had any successful bio-similars developments. This emphasises the effect of trust on network performance by decreasing uncertainty, facilitating learning, and

rendering relationships more stable as explained by Klijn et al. (2016). This perception was capitalised on by Giest (2019) who highlighted the importance of personal relationships, shared experiences, and third parties in building trust that ensures performing contractual obligations. CS1's case shows that trust-building in partners' ability to perform their roles for this project was not performed properly enough to ensure the commitment and competence of partners (Bergh et al., 2011). On the one hand, CS1 had missed the part related to assessing the previous history of the external developer and its track record of similar projects and the company did not contact any previous partner of the external developer to inquire about their experience in dealing with them. On the other hand, the company was eager to launch the project for the sought benefit of being a pioneer in bio-similars field in the MEA without properly conducting the necessary evaluation of its network actors (i.e., consultants and developers) in terms of their capabilities to perform well and execute the project successfully.

4.2.2 Case Study 2 (CS2)

Main fields of business	Pharmaceuticals, medical devices, cosmetics, and food supplements
Main therapeutic areas	Ophthalmic, ENT, paediatrics, and dermatology
Number of products	140 SKU
Ownership structure	Private shareholding company

4.2.2.1 Company Overview

CS2 was established in Jordan in 1990 as a private shareholding company and specialised in the production of pharmaceuticals, medical devices, cosmetics, and food supplements. The company regularly establishes 5-year development plans for growth and expansion. An international private equity firm (the investor); an investment arm of a leading regional bank, showed interest in 2018 to invest in API. The main areas of interest for the investor in Jordan were health and education and after a preliminary scan of the market, they realised that CS2 is a company that meets their investment goals. This came in line with API's plans to attract investors and use the funds for innovation, development, expanding the company's portfolio, and increasing production

capacities inside and outside Jordan. In addition, CS2 was looking for more governance and exposure to advanced financial expertise. The interest was mutual and so the collaboration efforts were started by signing an NDA in early 2018. The investor examined CS2's financials through an external consultant and found them to be adequate and satisfy their evaluation criteria. This was followed by technical due diligence that was commissioned by an international third party, legal due diligence that was done by another party, and commercial due diligence by a specialised firm. Moreover, regulatory due diligence was performed to ensure that API's products were properly registered. After CS2 passed all these evaluations, the next step was signing a letter of intent (LOI) and a shareholders' agreement indicating the targeted share price and the number of shares to be acquired. The discussion continued until the law of capital gain tax was enforced in 2019. At that point, CS2 approached a specialised expert from its business network to assess the impact of this law on the on-going deal and it was realised that it will have a significant financial impact on the expected gain by API's shareholders. This has resulted in re-negotiating the previously agreed upon share selling price to compensate for the drop in proceeds as a result of the newly applied law. The negotiations did not lead to any agreement and the investor refused any change to the previously approved terms in the LOI. During the same period, the investor had some internal issues that resulted in restructuring and a major change of staff, and this had an impact on the deal as well. CS2 perceived the earlier relationship with the investor as a personalisation approach that depended heavily on the team that was involved and that was the real driver of the anticipated deal. When this team changed and CS2 was requested to deal with a new team that was not as informed and professional as the previous one, API's management did not see eye to eye with the new team on many aspects, such as the earn-out for the management. This refers to a fee structure in the acquisition deal where the seller earns part of the purchase price depending on the business performance after the deal. This was coupled with the fact that a management contract was not signed up to that point and CS2 management felt that the deal was not heading in the right direction. Moreover, API's management realised that the new team appointed by the investor had no previous knowledge about the pharmaceutical industry and how it differs from other industries and accordingly

their ability to add value to the business was questionable. Another factor that affected the on-going discussion was the financial issues the investor had faced following an internal restructuring process, which forced them to reconsider their investment plans. These factors collectively made it difficult for the two parties to continue their discussion and the deal was accordingly called off. After this experience, CS2 realised that entering any networking venture must have enough preparation from their side. This includes identifying the objective of networking and ensuring that the anticipated partners are aware of their industry and are sufficiently equipped with the required resources.

4.2.2.2 Chronological Events of the Case Study

The following table illustrates chronological events that summarise API's case study.

Year	Important events
1990	CS2 was established.
1/2018	API's board established a 5-year development plan that focused on innovation, development, expanding the company's portfolio, and increasing production capacities.
6/2018	CS2 was approached by a private equity firm (the investor) looking to acquire a share in CS2 and inject funds.
8/2018	API's board and the investor signed a Non-Disclosure Agreement (NDA).
9/2018	API's board received a Letter of Intent (LOI) from the investor indicating their wish to partner with CS2 and inject funds into the company to support its development plan.
10/2018	Kick-off of financial evaluation.
11/2018	Kick-off of technical and regulatory due diligence to assess the company's capabilities to achieve development and expansion objectives.
12/2018	Kick-off of legal due diligence.
2/2019	The signing of a shareholders' agreement.
2/2019	The signing of share purchase agreements with all the shareholders indicating the number of shares to be acquired from each shareholder.
3/2019	The government of Jordan enforced capital gain tax law and after

	consulting an external expert, API's board realised the impact of this law on the anticipated deal and the decrease in revenue expected by shareholders.
3/2019	The investor performed restructuring and appointed a new team that had a different perception and strategy regarding the anticipated deal.
5/2019	The deal was called off.

4.2.2.3 Challenges to Innovation

One of the issues that started the interruption of the discussions between CS2 and the investor was the enforcement of the capital gain tax law which was going to affect the deal under consideration. Such external and other applicable regulations that are controlled by neither of the two parties of the deal can have a significant impact on networking and development plans. However, API's management has indicated that they knew about the said law and that it was under study but never expected that it would be finalised and approved so fast. The company has realised that in future deals, it might be required to scan relevant authorities for laws and regulations that are under study and assess their possible future impact on their business. This is an example of the building blocks a local partner needs to provide for an innovation network to strengthen collaboration and avoid any unexpected interruptions (Berger et al., 2016).

4.2.2.4 Innovation Factors

Among the factors that had an impact on the networking event that CS2 experienced, the change of the investor's team at an advanced stage of the deal discussion significantly affected API's perception towards the strategic fit of the parties (Easterby-Smith et al., 2008; Nielsen, 2010). API's management was looking for a long-term partner who would contribute to its plans of development, acquiring other companies, and future growth, while the investor's new team was more concerned with an exit strategy, inflating numbers, maximising gains, pushing for investment milestones, and achieving their targets. As explained by participant JO-CS2-1:

“I cannot strike a deal with anyone nowadays unless I am psychologically comfortable with them. It is not all emotional, but if something doesn't feel right, I will not go ahead”.

This comfort and ease were expressed in terms of having a mutual vision and ambition regarding API's future and alignment of strategic direction away from individual and one-sided ambitions (Easterby-Smith et al., 2008; Nielsen, 2010). Moreover, one of the crucial factors that influence innovation is that necessary funds are allocated to projects that are under evaluation to ensure that funds are sufficient and readily available when the decisions to launch the projects are taken (Fagerberg, 2003; Derbyshire and Giovannetti, 2017).

4.2.2.5 Innovation and Networking

CS2 has realised the importance of creating awareness among potential investors regarding the pharmaceutical industry and presenting it as a unique investment field that has its characteristics and differences (Scherer, 2000). The company believes that such a step is essential to increase the possibility of networking to succeed and achieve its anticipated objectives. This direction is in line with the concept of absorptive capacity and highlights a similar concept among external entities entering networking ventures with organisations working in industries that they are unfamiliar with (Cohen and Levinthal, 1990; Lewin et al., 2011; Schilling, 2017). The absorptive capacity in this case is perceived as the ability of an external investor to understand the industry and the investment opportunity therein and decide upon investing in it. The absorptive capacity can also be expressed in how external investors can match their expectations to the realities of a new industry. For example, reaching a reasonable investment period that considers the cycle to develop, register, and commercialise a pharmaceutical product, which usually takes between four to five years, and an investor's wish to make a profitable exit from an investment after almost the same period.

4.2.3 Case Study 3 (CS3)

Main fields of business	General anti-biotic, anti-hypertension, diabetes, CNS, semi-solid, ovules, suppositories, and syrups
Main therapeutic areas	Gynaecology, GI, anti-inflammatory, and hormones.
Number of products	124 SKU
Ownership structure	Private

4.2.3.1 Company Overview

CS3 was established in Jordan in 1999 as a private limited shareholding company and was fully acquired by a group of investors in 2008. The company produces general anti-biotic, anti-hypertension, diabetes, CNS, semi-solid, ovules, suppositories, and syrups as branded generic pharmaceutical products. According to participant JO-CS3-1, CS3 had a modest research and development function in 2008 and was not in a financial position to establish a reliable function that would serve the company's needs and strategic plans. In the same year, CS3's owners approached a CDO (Contract Development Organisation) that was newly established by a group of specialised research and development experts and offered to acquire a share in the company. The CDO had already started developing pharmaceutical product dossiers that were ready for scale-up production and registration. CS3 agreed with the CDO to acquire a share of 25% and obtain pharmaceutical products dossiers for free and to pay a royalty based on actual sales for five years, which, as explained by participant JO-CS3-1, was a perfect scenario for CS3 considering its financial position. They also agreed to be allowed to manufacture the products from the same dossier in different countries where CS3 operates. CS3 started obtaining new product dossiers from the CDO; most of which were the first generic products to markets after the originator products, adding a competitive advantage to CS3. All dossiers were compliant with the regulations of regulatory bodies in the region, such as Jordan Food and Drug Authority (JFDA) and Saudi FDA, and were ready for registration. By receiving and reviewing the dossiers, CS3's regulatory staff started building the knowledge for compiling and preparing files to be ready for registration. During the course of networking with the CDO, CS3 obtained more than 20 different products, which significantly enriched the company's portfolio. The partnership

included technology transfer in terms of sourcing active pharmaceutical ingredients (API), supervising the scale-up production, analysis methods, and stability evaluation of new products. It also included training relevant staff members at CS3 on the manufacturing and testing of new products, which was a key factor in establishing a full-fledged research and development function at CS3. At a time when CS3 was facing some financial challenges, it also outsourced most of its quality control activities to the CDO and achieved considerable savings. However, this arrangement changed when the financial situation became better to be more effective and responsive to in-process quality control. In addition, CS3 had the privilege of deciding whether to perform and cover the cost of clinical bio-equivalence studies; a major component of the development process of any generic pharmaceutical product, or wait until the CDO handled it. The decision was mainly based on the priority CS3 identified for the products under development and what best suited its interest and capabilities.

In 2021, the CDO established its manufacturing and commercial arms and started developing new products under its brand name. The CDO continued offering its product dossiers for CS3 and other companies, but only as second brands after launching their commercial brands. CS3 realised that this arrangement would eliminate the competitive advantage it had by working with the CDO in being the first-to-market after the originator brands. In addition, the CDO started utilising its GMP manufacturing facilities for scale-up production and did not require any external entity for this purpose. Both parties were in a position that did not require integration with the other party, and they decided to end the networking venture. In 2021, CS3 decided to sell its share in the CDO to other partners and started depending on its research and development function for the development of new products.

The main advantages CS3 had from this networking venture in dealing with an external CDO were obtaining the product dossiers with no down payment and the ability to assess the manufacturability of new products at an early stage during the scale-up production in CS3's GMP compliant facilities. In addition, CS3 had access to informed social capital and external resources that expedited its growth and the development of its internal capabilities. Participant JO-CS3-1 believes this was a successful networking

experience for CS3 in terms of acquiring know-how, managing the company’s financial resources effectively, and enriching the company’s product portfolio with commercially viable products.

4.2.3.2 Chronological Events of the Case Study

The following table illustrates chronological events that summarise CS3’s case study.

Year	Important events
1999	CS3 was established.
2008	CS3 was acquired by a group of investors.
2008	One of the company board members suggested acquiring a share in a newly established CDO in Jordan by a group of research and development experts that were among the informal network of the board member.
2008	CS3 agreed with the CDO to acquire a share of 25% and to obtain pharmaceutical product dossiers for free and to pay royalty for five years.
2009	CS3 started obtaining new product dossiers from the CDO and most of them were first generic to markets; adding a significant value to CS3, which had a modest research and development function at the time.
2009-2017	CS3 obtained more than 20 different products from the CDO, which enriched the company’s portfolio.
2018	CS3 established its full-fledged research and development function by building on the cumulative experience from its partnership with the CDO.
2021	The CDO established its manufacturing and commercial arms and started developing new products under its brand name.
2021	CS3 sold its shares in the CDO to avoid any conflict of interest.
2021	CS3 started depending on its research and development function for developing new products.

4.2.3.3 Challenges to Innovation

The main challenge to innovation that CS3 experienced during this collaboration was the need to retain any financial revenues from its partnership with the CDO so that it will

have sufficient resources to operate. However, this was mitigated by the anticipated benefit of obtaining product dossiers for free and paying royalty fees only, thus reducing the investment needed in new product dossiers. Another challenge was related to the initial selection of the products to be developed, where the CDO took the first step in proposing such products to CS3. The CDO used to explain the justifications behind new products, some of which were requested by other customers, focusing more on the scientific aspect in terms of manufacturability rather than the commercial aspect in terms of market potential. Some of these proposed products were not in line with CS3's strategic plans or therapeutic areas of interest, which required a thorough evaluation of the feasibility of products to be chosen away from the pressure of readiness and availability. This was overcome by CS3 carefully assessing the level of diversification of its products and the needed investment in manufacturing lines and marketing teams to market its products upon commercialisation (Kennedy, 1997).

4.2.3.4 Innovation Factors

Among the factors that had an impact on the networking event that CS3 had experienced was the initial financing of the newly developed CDO that was essential to launch its operations. In addition, CS3 utilised its manufacturing facilities for the scale-up production of newly developed products, which helped in monitoring and controlling the progress of development projects and resolving any technical issues at an early stage. Furthermore, the technology transfer process from the CDO to CS3 was a major enabling factor in the innovation process. It also ensured the future manufacturability of the newly developed products as the scale-up production was performed on the same production lines (Bonem, 2018). The human factor played a key role in this networking venture for CS3 by utilising senior research and development staff that worked partially in the two collaborating parties and were essential in executing and ensuring a smooth technology transfer process and establishing a mature and competent research and development function at CS3.

4.2.3.5 Innovation and Networking

This case study illustrates how board members of pharmaceutical organisations in the MEA region utilise their social capital and connections to establish networks for the

objective of developing innovative capabilities of their organisations. It is also an example of how informal networks can be the basis for establishing formal collaborations that play a key role in technology transfer and capabilities improvement. This networking experience was beneficial to CS3 in terms of securing ready-for-registration pharmaceutical product dossiers and allowing the company to be the first-to-market after the originator of some strategic products. This has resulted in commercial gains for CS3 and establishing a sustainable market share in the local and some export markets. It also helped in providing outsourced testing capabilities for the company and saving the need to invest in establishing specialised and expensive labs for this purpose. It also allowed CS3 to gradually acquire the testing technology from the CDO for newly developed products by utilising the basic equipment that CS3 started to install. In addition, networking with the CDO had some financial benefits for CS3 by achieving savings in quality control investment and operational expenses. Another aspect of saving was related to the cost of bio-equivalence studies for new products, where the collaboration between the two parties was fully utilised to identify the most feasible option for conducting and covering the cost of such studies. Moreover, CS3 initiated its research and development function by establishing a unit that performed troubleshooting for issues related to the registration of newly developed and existing products and then the company established a full-fledged research and development function based on this unit. This was supported by specialised staff from the CDO working with the new team and supervising their training until a mature function was realised. At this stage, CS3 started being able to fully develop its products that are in line with its strategic plans and areas of interest (Zapata et al., 2008).

4.2.4 Case Study 4 (CS4)

Main fields of business	Solid, semisolid and liquid dosage forms (tablets, capsules, ointment/cream tubes, dry suspension bottles, syrup/liquid/drops bottles, suppositories, and topical solutions)
Main therapeutic areas	Allergies, CVS, Dermatology, vitamins and supplements, GI, Infectious Disease, pain and inflammation
Number of products	56 SKU
Ownership structure	Public Liability Company

4.2.4.1 Company Overview

CS4 was established in Jordan in 1994 as a private limited shareholding company and became a public company in 2006. The company produces solid, semi-solid, and liquid dosage forms of branded generic pharmaceutical products. The company used to import one of its strategic products called Fluibron from an Italian manufacturer through one of its sister companies. Fluibron was originally made in Italy; its country of origin (COO), in a 200 ml bottle but the market need in Jordan was for a smaller bottle of 100 ml for pricing reasons and convenience of use. Producing Fluibron in small sizes enabled CS4 to introduce a specially manufactured product for Jordan and produce a larger batch size of 100,000 bottles to make it feasible. It also required special stacking, packing, and shipping conditions to ensure the products arrive safely at their destination. According to participant JO-CS4-1, all of these were conditions that CS4 had accepted because of the importance and potential future sales of this product in Jordan. The manufacturer approached CS4 later with another request to increase the batch size from 100,000 to 200,000, which was more than the market demand at that time, to make the business sizable to the manufacturer to keep an additional SKU. The manufacturer was also contemplating discontinuing the 100 ml size for Jordan. At the same time, and since the product was registered as an originator product in Jordan, CS4's registration department records indicated that the product was identified as a reference product for any future generic version of it. This meant that this product will be referred to for comparing technical specifications and identifying the selling price of any generic product using the same composition and indications. Based on general pricing strategies for medicines, if a product's price in the originator country drops this will imply a reduction in its registered price in Jordan as well. At this point, CS4 started considering possible ways to freeze the price to avoid any price reduction risk. One of the ideas for achieving this was to convert it to a Jordanian product and prevent price referencing to its country of origin. CS4 asked the manufacturer to in-license the product and to establish a joint team between the two companies to undertake a technology transfer project. The manufacturer welcomed the idea but was concerned about product liability if they remained as the marketing authorisation holder for the product, which refers to the entity fully responsible and liable for the product. CS4 suggested keeping the brand name Fluibron owned by the

manufacturer and taking the marketing authorisation responsibility. This collaboration benefited CS4 by stopping the product price referencing to the country of origin, acquiring a product with an existing market share, and improving its economies of scale. The advantages for the manufacturer were removing special manufacturing runs, eliminating a low volume SKU, the relief from any liability related to the manufactured and marketed product in Jordan, and securing stable royalty fees. This was a win-win situation and the relationship still stands today as a smooth business collaboration case with no issues or interruptions. In addition, this was the first in-licensing experience for CS4, and it paved the way for more successful similar collaborations with other companies later on. In fact, due to such collaborations, CS4's innovation and development capabilities were improved over time to the point of developing new dosage forms of in-licensed products that are more relevant to the local market needs and that supplement the range of the original product.

4.2.4.2 Chronological Events of the Case Study

The following table illustrates chronological events that summarise CS4's case study.

Year	Important events
1988	A product called Fluibron was imported from an Italian manufacturer through a sister company of CS4.
1994	CS4 was established.
1995	The manufacturer demanded an increase in the size of the business and put special conditions for packing and shipping.
1997	One of CS4's board members suggested transferring the product from the sister company to CS4 via a strategic collaboration that entails in-licensing. The suggestion was accepted by CS4's management.
1998	CS4 established a collaborative network with the manufacturer to in-license the product while maintaining distribution with the sister company.
1999	CS4 launched a technology transfer project to manufacture the product locally.
2000	The manufacturer performed field audits on CS4 to ascertain compliance with cGMP (current Good Manufacturing Practices) requirements, reviewed the quality manual and the standard operating procedures, and

	performed an audit on facilities.
2001	CS4 started establishing strategic collaborations with other manufacturers to in-license more products of importance.
2003	CS4's internal innovation and development activities were improved, and the company started developing new dosage forms to supplement the range of licensed products.

4.2.4.3 Challenges to Innovation

The main challenges to innovation that CS4 experienced during this collaboration were the need to learn the manufacturing know-how of the product and accept the liability of a product that was originally manufactured by another company for the benefit of strategic positioning and commercial market gains. On the commercial side, manufacturing the product locally required an increased volume of production to meet the feasibility requirements. The executive team at CS4 felt that the company had the necessary internal capabilities to be able to quickly acquire the know-how related to the product. They also believed that it possessed competent commercial arms to generate the required sales for the increased volume. Nevertheless, CS4 had accepted the manufacturer's condition to supervise releasing the first three commercial batches into the market; a step that is done to ensure the compliance of the final products to standard specifications before reaching the market. However, CS4's executive team believed that the main driver for this development project was the high trust that was established with the manufacturer over time (Gulati and Gargiulo, 1999). This entailed the change of the professional relationship to become a personal one with the manufacturer's owners where frequent contacts and visits were performed. These aspects were essential for CS4 to take the challenge and accept bearing the responsibility and liability of the product because of the mutual trust that was established between the two parties. In addition, this long-term relation made each party sufficiently aware of the other's business conduct, attention to technical details, and actions towards situations where product specifications were impacted.

4.2.4.4 Innovation Factors

Among the factors that had an impact on the networking event that CS4 had experienced was the competent human resources that were able to execute technology transfer and master the manufacturing of the product to a degree that comforts CS4 being responsible and liable for it. This emphasises the importance of competent human resources in making strategic innovation decisions (Hitt et al., 2010). At the same time, the audits performed by the manufacturer on CS4's facilities and documentation were a learning experience for CS4 team that enhanced their technical capabilities and encouraged them to repeat the same experience in the future. Currently, in-licensing is one of the active strategic networking options that CS4 considers for its future business plans. Additionally, completeness and clarity of the product file as an element of the know-how factor was an important aspect that CS4 checked and reviewed during collaboration. This was done to make the necessary preparation for manufacturing the product and the establishment of the essential quality assurance and control procedures that would safeguard the product and accordingly its consumers. The technology transfer project included sharing the same sources of raw material based on the manufacturer's long experience in dealing with different international suppliers. By this, CS4 had utilised its partner's previous experience in facilitating its development project and saving the burden of repeating the efforts. Another factor that influenced this project was the similarity of CS4's facilities and infrastructure to that of the manufacturer. This was evident during the field audits conducted by the manufacturer as part of the technology transfer process. However, there were some slight changes and improvements that were highlighted by the manufacturer based on their previous experience to ensure uninterrupted manufacturing. These were mainly related to water treatment and measures to ensure the quality of water used for liquid medicines; an aspect that made a significant improvement to CS4's infrastructure and manufacturing facilities.

4.2.4.5 Innovation and Networking

For CS4, this networking experience was an example of a relationship that was established and developed over time to reach a stage where the partners were fully

cooperative, understanding of each other's needs, and thought mutually of their strategic interests. On the one hand, the manufacturer settled for less revenue commensurate with less effort from their side and willingly transferred long-term benefits to CS4 as its local partner. On the other hand, CS4 perceived the manufacturer as the right partner to perform technology transfer and trusted their technical capabilities to the point of accepting the liability for their product. Nevertheless, CS4 did its assessment and evaluation of the technical readiness of the product file and the inclusion of detailed information related to the best sources of raw material for the product. This action highlights the significance of checking the readiness of actors entering a collaborative network to avoid any issues or interruptions that might hinder collaboration (Samoilenko, 2019).

4.2.5 Case Study 5 (CS5)

Main fields of business	Branded generics, OTC, and food supplements
Main therapeutic areas	Neurology, Psychiatry, Cardiovascular, Orthopaedics, GIT, Paediatrics, Urology, and Dermatology
Number of products	75 SKU
Ownership structure	Private

4.2.5.1 Company Overview

CS5 was established in Egypt in 2007 as a private limited shareholding pharmaceutical company. The company's products cover various therapeutic categories including Neurology, Psychiatry, Cardiovascular, Orthopaedics, GIT, Paediatrics, Urology, and Dermatology. In 2017 CS5 was approached by MNC1; a company that is dominant in the field of diabetes pharmaceutical products worldwide. MNC1 learned that CS5 had developed and registered a diabetes medication that MNC1 didn't have among its portfolios. The product consisted of three concentrations; one was plain and the other two were combinations with other molecules. At that time, CS5 had finished the plain version, started with the second combination, and was about to start with the third. MNC1 offered to buy the plain product from CS5 and collaborate in the development of the two remaining versions. CS5 agreed to MNC1's proposal that included the agreement to manufacture the product in CS5 based on a contract manufacturing

agreement for Egypt and for export markets. A joint project management team was formed from the two companies and was assigned the responsibilities to conduct research and development activities, manufacture validation batches, register the products, and supervise the commercialisation stage. The team was also instructed to act swiftly and effectively on resolving any issues and taking the necessary decisions to facilitate the project's progress. CS5 and MNC1 started their collaboration by manufacturing and launching the first version of the product; the plain version, in Egypt. The collaboration continued on the research and development side by jointly developing the second version of the product; the first combination. They succeeded in developing the product, producing the validation batches, and submitting the product's file for registration to the regulatory authorities. Currently, the development teams are working on the third product; the second combination. The development teams that worked on the products were in Egypt and India, and most meetings had to be conducted virtually due to the pandemic constraints. This required both parties to put in additional time to have sufficient and effective communication to ensure the alignment of efforts and proper coordination of project activities.

Participant EG-CS5-1 believes that this was a very successful networking venture for CS5, and he has no objections to repeat it. Both companies are still working on other development projects for products of strategic importance and market potential.

4.2.5.2 Chronological Events of the Case Study

The following table illustrates chronological events that summarise CS5's case study.

Year	Important events
2007	CS5 was established.
2017	CS5 was approached by the multinational company MNC1; a famous company that had made many mergers and acquisitions that resulted in a big group of united companies.
2017	MNC1 proposed to collaborate with CS5 regarding the development of a diabetes product that CS5 had registered in Egypt.
2017	MNC1 sent a term sheet and contractual agreement for the anticipated

	networking with CS5.
2018	MNC1 finalised the necessary reviews and approvals of the contractual agreement.
2018	CS5 and MNC1 launched their collaboration by manufacturing a plain version of the product.
2019	MNC1 launched the newly developed product.
2019	The research and development departments in CS5 and MNC1 worked jointly on developing a second version of the diabetes product.
2021	The second version of the product was submitted for registration.
2021	The research and development departments in CS5 and MNC1 started working on developing a third version of the diabetes product.
2022	The research and development departments in CS5 and MNC1 are currently working on developing other products.

4.2.5.3 Challenges to Innovation

The main challenges to innovation that CS5 has experienced during this collaboration were the long approval times by MNC1 on the contractual terms and the volume of paperwork that needed to be completed to finalise the collaboration agreement. This was due to the company's culture and internal systems that implied the need to review and sign contractual agreements by many managers in different countries. According to participant EG-CS5-1, this was much different from CS5's culture that required such agreements to be approved and signed by one person: the Managing Director. To deal with this challenge, participant EG-CS5-1 used to contact MNC1's decision-makers in different countries and encourage them to facilitate the necessary approvals of the agreement by explaining the impact of delays on the anticipated project. Another issue was conducting some of the development discussions and meetings virtually due to the constraints of the pandemic, which resulted in longer product development times.

4.2.5.4 Innovation Factors

Among the factors that had an impact on the networking event that CS5 experienced was the fact that both parties were open-minded and committed to making this networking a success story. CS5 was ready to openly share its previous development achievements related to the product with MNC1 and was open to adopting new development systems and procedures. Another factor was the effective problem-solving capability whenever needed, which was the result of forming an effective and dynamic project team with identified authorities and responsibilities. CS5 had played a key role in changing the culture of MNC1 in terms of long decision-making by creating a project management team from both companies that had the knowledge and authority to act swiftly on resolving any issues. Additionally, both parties had the will and dedication to give the necessary time and effort for this strategic project and convey the same spirit to their teams.

4.2.5.5 Innovation and Networking

This networking experience was beneficial for CS5 in terms of developing the research and development capabilities and exchange of experience with their counterparts. MNC1 had a vast and proven experience in research and development, and this had a significant impact on acquiring new skills and capabilities by CS5 employees. In addition, MNC1 had its own proven development systems and procedures that were implemented during collaboration, which was an added advantage for CS5. The methodology that MNC1 followed in documenting its systems and procedures was a new experience for CS5 that reflected on improving the documentation and design of systems and procedures related to other functions. Moreover, excluding the unusual delays caused by the pandemic, working with MNC1 and acquiring new development skills shortened the development time of new products and made their commercialisation faster. Finally, CS5 achieved some financial gains from this joint project with MNC1 in terms of generating more sales and increasing profitability.

4.3 Cross-case Findings

4.3.1 Overview

This section collectively analyses the findings of the case studies that were performed for this research. In addition, quotes from the conducted interviews were interpreted to understand how the participants felt and interacted in their business and social worlds. As part of the analysis the researcher identifies trends and patterns around the three main themes of this research comprising innovation challenges, innovation factors, and innovation and networking. The analysis outcome is used as one of the inputs to identify the research findings and shape the intended model of networking that can serve the objectives of this research. The analysis undertaken across the case studies investigates the connection between the activities related to innovation that were performed by SMEs. Also, the researcher reflects on the connections that were established on the theoretical framework located on page 48 that was developed based on the literature review. In this regard, the analysis aims to utilise the case studies' findings to confirm as well as refine the connections between research variables or suggest other connections or variables to reflect the context of SMEs in the pharmaceutical business in the MEA. To study these connections, the researcher addresses the main themes of this research across the five SMEs where the case studies were conducted as shown in table 11. The way that each studied SME reflected on the identified research theme is briefly illustrated in table 11 to provide an overview of the similarities and patterns in how the SME approached innovation and networking. These similarities and patterns helped in analysing connections between the research variables and were used by the researcher for formulating propositions that were the bases for establishing a model for collaborative networking as indicated in section 5.2.

Table 11: A Summary of Case Studies Findings According to Research Themes

Research Theme	CS1	CS2	CS3	CS4	CS5
Innovation Challenges	Acquiring know-how, funding innovation, and market feasibility.	Impact of laws and regulations on innovation and the need for funding.	Similar to CS1.	Similar to CS1, plus the impact of economy of scale.	The impact of a company's culture on innovation.
Innovation Factors	The impact of the human factor and financial resources on innovation.	The effect of collaborating teams on innovation projects.	Similar to CS1 and CS2.	Similar to CS1, plus the role of human factors in technology transfer.	Same as CS4, plus the effect of openness and commitment on innovation.
Innovation and Networking	The impact of trust-building on networking.	The importance of creating awareness for partners to ensure alignment.	Similar to CS1, plus utilising social capital in networks.	Similar to CS1.	Similar to CS1; the impact of the experience of partners on networks.

The following sections address the findings pertaining to each of the research themes across the five case studies and their impact on innovation.

4.3.2 Innovation Challenges

The observations across the five case studies indicate that there are common challenges that are faced by SMEs in the MEA while developing or complementing their innovative capabilities and that these SMEs approach and mitigate these challenges in similar ways. These challenges are categorised as per the following:

4.3.2.1 Organisational and Structural Limitations

To confront the innovation challenges few companies were required to perform some structural or ownership changes. As an example, CS2 was ready to accommodate new investors to buy a stake in the company and inject funds into its development plans, which reflects a high level of commitment towards innovation. Similarly, the change of ownership in CS1's case was a requirement to be eligible for government funding that was needed to fund the acquisition of know-how for a new product. It also indicates how owners and members of the board of directors take strategic and major decisions

to achieve differentiation and gain competitive advantages through innovation. As explained by participant SA-CS1-1:

“When faced with the need to make a major decision, members of the board of directors found their way to amicably agree on a change of ownership to benefit from governmental funding for innovation projects.”

The same story was conveyed by participant JO-CS3-1 from CS3 where a structural change was done in terms of the responsibility of conducting research and development. The company made an investment in another external entity specialised in research and development to enrich the company’s portfolio with new products and build the innovative capabilities of CS3. He explained:

“We opted to outsource our research and development function and it was a successful investment that gave us a marketing competitive advantage and was the base for developing our internal research and development function.”

A similar example was observed in CS5’s case, where the company had established an internal team from relevant technical entities to be responsible for the coordination with the external partner MNC1 for a development project. The extension of the scope of cooperation between the two companies has driven CS5 to make some structural changes to ensure that the systems for authorities, responsibilities, reporting channels, and corrective actions are well established to ensure proper project execution. Participant EG-CS5-1 explained these changes by saying:

“We had an effective problem-solving capability in our networking project with MNC1. This was the result of forming an effective and dynamic project team with identified authorities and responsibilities.”

More similar structural changes were observed in CS4’s case where some technical internal functions were identified as providing crucial input for innovation and were perceived to be essential to participate in managing the innovation process. The suggested functions were of different disciplines to ensure that comprehensive evaluation is performed for innovation projects at the conception phase. Participant JO-CS4-6 explains this by indicating:

“We need to have a committee headed by someone qualified and dedicated, and the committee must include members from research and development,

operations, marketing, and finance to do their role and check the feasibility of innovation.”

These examples illustrate that pharmaceutical organisations in the MEA take major and practical steps to ensure their readiness to be involved in innovation projects. They also show that such organisations are willing to make permanent organisational and structural changes that would provide sufficient financial, technical, and commercial support for innovation. These changes cover several operational functions at SMEs and are made to ensure that organisational structure and setup are in line with the requirements that are essential to support innovative capabilities. Based on these findings, the following proposition is suggested:

Proposition 1: Obstacles limiting a firm’s ability to innovate in the MEA require organisational and structural changes in alignment with the operating environment.

4.3.2.2 Innovation Laws and Regulations

CS2 faced another type of challenge related to external laws and regulations that had an impact on its on-going efforts related to innovation. Participant JO-CS2-1 indicated that the board of directors was under the impression that new laws and regulations usually take a long time to be active, but that was not true in their case. He further confirmed that:

“If we learnt something from this experience, then it will be that we have to spend some good time scanning the external environment as we do for the internal environment.”

This case highlights an extended impact of laws and regulations, which were related to capital gain and taxes, to be added to the commonly expressed impact of regulations on the registration of innovative products in the MEA markets. Collectively, these regulations include those addressing the economic environment in Jordan in general and those impacting the pharmaceutical industry in particular. All have a significant effect on innovation and need to be taken into consideration. Doing so will keep SMEs that are embarking on innovation projects or planning to participate in innovation networks fully informed about the impact of such regulations on their on-going innovation efforts. In addition, being fully aware of the applicability of such regulations

on innovation projects or transactions will save SMEs time, effort, and resources that can be affected by these regulations.

A similar perspective was explained by participant JO-CS4-1 who talked about the impact of laws and regulations on locally innovated products in terms of pricing:

“Instability of laws and regulations and unfavourable pricing strategies for innovative products (ex. combinations of products) leading to no commercial benefits are among the challenges to innovation in the MEA.”

Participant SA-CS1-1 touched upon the pricing issue as well and highlighted another challenge related to regulations that is significantly affecting innovation in SMEs in the pharmaceutical sector in the MEA:

“For new developments and new ideas and why generic companies in the MEA depend on copy paste and don’t pursue new ideas or enhancements that do not require full clinical studies, the first challenge is regulations because they will not accept your product for registration for the lack of a reference product, then the lack of a financial advantage after all of your efforts because they only have a price reference for the product before enhancement.”

This example illustrates the lack of motivation for SMEs in the pharmaceutical sector to pursue and invest in innovation for the lack of pricing advantages for innovative products that do not have existing reference products. This highlights the need to involve relevant governmental authorities, such as regulatory bodies, in innovation ecosystems and create the necessary awareness among such entities so that they can actively support and facilitate innovation projects. This can be part of governments’ overall strategies and initiatives to establish sustainable economic development in their countries. In this context, several participants emphasised the possible role of manufacturers’ unions in addressing such governmental authorities to have regulatory laws amended to allow for different levels and forms of innovation. Participant JO-CS3-5 suggested that:

“This might be achieved if a certain governmental authority or a union (such as the Jordanian Association of Pharmaceutical Manufacturers) pushes for amending the regulations rather than private companies or individuals.”

This quote highlights the expected impact of the collective efforts of pharmaceutical organisations in the MEA through the industry unions and other similar entities on

governmental authorities to improve laws and regulations rather than addressing such entities individually. Doing so will have a bigger influence to amend related laws and regulations and will bring comprehensive feedback and views from the pharmaceutical industry to be presented to governmental authorities. This is expected to create a level of trust that amending these laws and regulations is justified and reflects the pharmaceutical industry's needs rather than individual organisations' ambitions. Accordingly, such an improvement on innovation laws and regulations is believed to launch more innovation initiatives and flexibility in addressing commercial opportunities. These insights offer the following proposition:

Proposition 2: Innovation laws and regulations in the MEA need to allow for creativity and commercial viability of innovative pharmaceutical products.

4.3.2.3 Organisational Culture and Innovation

The case of CS5 highlights the impact of a company's culture on the progress of innovation projects and how common practices in certain companies, such as long contract approval cycles, can be seen as challenges by other related companies. Participant EG-CS5-1 explained his experience in dealing with such types of challenges by saying:

“We had to deal with a different type of company culture that we are not used to when we worked with MNC1, but when both parties are committed and determined, this becomes something that can be worked on.”

However, this case illustrates how commitment to innovation and the belief in its value to the organisation create the will to change previous practices that negatively affect the progress of innovation. It also indicates how a company that is familiar with dealing with external parties receives and appreciates feedback concerning its internal environment and willingly accepts to change it for the better. The cultural aspect was also observed in CS4's case, where the company has instilled the spirit of competition and excellence among its employees, thus creating a company culture that encourages accepting challenges, taking initiatives, and gaining trust based on achievement. An interesting finding in CS4's case is how the cultural aspect influenced the establishment of a different working environment that values challenges and

achievements and shows their impact on building employees' capabilities and accordingly supporting innovation. This adds a new perspective to the literature which assumes that employees' education, skills, and interaction with experts are important factors to facilitate innovation (Rothaermel and Hess, 2007; Stuart et al., 2007; Ramadani et al., 2019; Niosi and Queenton, 2010). Participant JO-CS4-1 explained this by saying:

"Managers who work on gaining trust, demonstrate ability, have the mind-set, and have the analysis power will eventually have empowerment."

Similar behaviour was observed in CS2 where participant JO-CS2-1 indicated that they have a weekly informal gathering between top management and employees from different managerial levels. He explained that:

"Discussion in these gatherings is usually out of the box and is focused on how everyone sees the way to do things better and take the company forward. It has created a culture of creativity and innovations, even in simple matters that made a difference."

Participant JO-CS4-1 had a say in this aspect too by referring to what he calls "social barriers" which he explained as:

"We need to remove the fear factor. Those with ideas will be afraid of being ridiculed, fear of not being sure about the idea, fear of rejection, fear of not being taken seriously, and fear of making them responsible and then accountable. Removing the gap between upper management and lower levels can eliminate these fears. Also, management must be more tolerant of mistakes and make that practically obvious to employees."

These observations illustrate that a positive company culture is a driver of innovation and is essential to creating an engaged, committed, and innovative team of employees who assist their companies in facing any challenges or issues that hinder innovation. They also indicate the crucial role of an organisation's top management in establishing a company culture that encourages and fosters innovation. In addition, evidence from the case studies ascertains that removing the gaps between different managerial levels and adopting an open-door policy are essential to streamlining innovative ideas and initiatives. This establishes a connection between innovation and traditional norms and practices by an organisation's management that indicate acceptance, tolerance,

and encouragement of creativity. These insights and perspectives about company culture, innovation, and policy have led to the following proposition:

Proposition 3: A positive company culture can support innovation in SMEs in the MEA, and it can be established by removing the gap between upper management and lower levels of employees, encouraging creativity, and being more tolerant towards mistakes.

4.3.2.4 Innovation and Economic Factors

The challenges related to the commercial aspect were observed throughout the five case studies as well. In CS1, participant SA-CS1-1 believes that the anticipated market demand and feasibility are crucial elements to justify investing in innovation. He elaborated on this by saying:

“There is a certain distance between innovation and creativity on one side and business on the other side. If this distance is long innovation and creativity will become dreams and nonsense and if it is short they will be day-to-day work and common sense. So, a certain distance and a certain interest have to be maintained, not far from the material element, resources, and market demand, but not close to operations. For anything to succeed it must have a justification for existence and promising ideas are the ones that come from the market.”

Participant JO-CS4-1 had a similar perspective in highlighting the economy of scale as a crucial element in encouraging and facilitating innovation projects:

“Among the challenges that innovative SMEs in the MEA face is economies of scale that do not encourage or absorb innovation costs, rendering innovation projects as unfeasible and unjustified investments.”

Participant JO-CS4-3 indicated a similar point of view on this issue:

“In starting a molecule as an originator and spending money on doing the clinical studies, people decided not to go there because it is unfeasible and believed they will never come up with a molecule and the cost will never be justified.”

This aspect was also observed in CS5’s case where the investment in developing new products was justified by the access to new markets through the partnership the company had established with MNC1. This was explained by participant EG-CS5-1 who said:

“Our agreement with MNC1 included the arrangement to manufacture products in CS5 based on a contract manufacturing agreement for Egypt and export

markets. This has created a feasible project that facilitated the investment in innovation.”

These examples ascertain the commercial aspect as a key challenge to innovation in the MEA because the market size in most MEA countries is relatively small in comparison to markets in developed countries, thus creating an obstacle for absorbing the investment cost and for the feasibility of innovation projects. This is mostly evident in conducting costly clinical studies on innovative products to ensure their safety and efficacy (DiMasi et al., 2016; Singh, 2018; Horvath et al., 2019). Accordingly, expanding the market base directly or indirectly through partners can create the economy of scale advantage and provide confidence that encourages and justifies the investment in innovation. These findings suggest that SMEs in the pharmaceutical sector require precautionary steps in approaching innovation projects to safeguard their investments and resolve the anticipated obstacles. The findings also highlight the feasibility and commercial viability of an innovation project as critical factors of innovation in the MEA.

Based on the foregoing discussion on the relation between innovation and economic factors, the following proposition is offered:

Proposition 4: Economies of scale have a significant impact on the feasibility of innovation projects in SMEs in the pharmaceutical sector in the MEA and can be attained through access to wider market networks.

On a larger scale, the effect of dynamics of growth, macro-economic indicators, resources, and capabilities in a country on innovation was also investigated and the participants shared different views and examples related to this aspect. On the one hand, some participants indicated the high impact of such factors on creating an environment that is essential for innovation, and on the other hand others explained the supporting, yet inessential, role of these factors in facilitating innovation. Participant JO-CS4-1 gave high regard to these factors and highlighted their impact on creating an innovation culture and fostering innovative ideas:

“Countries with high dynamics of growth will generally have a better culture, opportunities, and possibility for innovation. Disruptive and game-changing

technologies can come out from a single person who might not be heard in countries with low dynamics of growth. The number of patents registered by each country is a clear indicator of this. These factors affect innovation because when they increase education increases and families' awareness increases, and a social effort is generated to elevate society. Resources and capabilities surely influence innovation."

Participant JO-CS3-5 had a similar point of view, but indicated the impact of macro-economic indicators on creating an ecosystem that provides individuals with the necessary conditions and factors to initiate innovation:

"Dynamics of growth and macro-economic factors will increase innovative capabilities. When individuals' minds are freed from the loop of securing their living and have high-income levels then they will be able to think and innovate."

Contrary to these opinions, other participants saw no relation between a country's macro-economic indicators and innovation and gave several examples of countries with innovation breakthroughs and limited economic capabilities to prove their perception. They believed that other factors, such as market needs, knowledge, and competition can play a crucial role in encouraging innovation and creativity, regardless of the prevailing macro-economic conditions.

Participant JO-CS3-1 gave a slight impact to macro-economic factors on innovation in terms of an internal motive for people to innovate:

"Dynamics of growth and macro-economic factors are not directly linked to innovation but will create a better appetite for innovation."

Participant SA-CS1-3 gave more weight to other factors as drivers of innovation in the MEA:

"Innovation comes from necessity, like the example of Cuba, which is GDP-wise not a good country, but they had a necessity, so they invested in that. So, I think it is a good thing to have a good GDP for basic research, but also a necessity and the thinking process of the authority. There are so many poor countries that have better knowledge and put more effort into research than high GDP countries. When there is a competition and a talent pool in front of you, and you are facilitating brainstorming, some output will come."

This quote highlights some of the drivers of innovation in the MEA, by emphasising market needs and government support systems in terms of a political will that believes

in and fosters innovation. It also touches upon the crucial role of human resources and the needed setup for them to be qualified to initiate innovation.

Participant JO-CS2-1 had a similar opinion and highlighted the role of governmental support systems in facilitating innovation and gave more examples to prove his opinion:

“In my opinion, dynamics of growth have no relation with innovation, but they can assist in innovation. If you have support systems in developing countries innovations will happen. We have examples of this in the Far East and some African countries; where their macro-economic parameters are not good, but they are doing very well in innovation for which they have support systems. There are countries where the GDP is bad and economically they are suffering but in the last 10 years they have support systems for innovation.”

Another supporting argument came from participant JO-CS2-3 who saw no relation between macro-economic indicators and innovation and gave further examples:

“For sure it is not a motive for innovation. For a country like Jordan, these macro-economic indicators are not motivating innovation at all, and in certain circumstances, they do not relate to innovation. Some countries that have dynamics of growth that are less than Jordan but have innovation. So, the macro-economy is not a motivator for innovation.”

Collectively, these points of view indicate with actual examples that macro-economic factors are not the main drivers or triggers of innovation in the MEA, but they have a role that assists in creating an environment that supports innovation. This perception encourages individuals and organisations in countries with challenging dynamics of growth to give little attention to the macro-economy as an obstacle to innovation and focus more on the internal capabilities and the people’s will to initiate innovation. Additionally, the views shared by participants highlight factors of market needs, knowledge, and competition as drivers and triggers of innovation. These findings and the nature of the indicated supporting factors suggest that the combined roles of SMEs and individuals in the pharmaceutical sector are crucial in securing these factors and facilitating innovation in a country despite its prevailing macro-economic conditions. This interpretation does not underplay the positive impact of dynamics of growth and macro-economic indicators on providing the resources and capabilities that are essential for innovation (Tsvetkova et al., 2017; Sharma, 2018). However, it extends

the literature on the relation between the degree of economic development and innovation and stands as an opportunity for developing countries with unfavourable macro-economic conditions to seek economic growth through innovation.

4.3.3 Innovation Process

Participants across the five case studies were asked about their perception of the proper process to identify, incubate, and develop innovation from conception till successful commercialisation. The feedback highlighted interesting points of view on how they addressed the innovation process.

Participant JO-CS4-1 starts by illustrating his belief regarding the significance of an innovation process:

“If there is an innovative idea or concept, that can withstand the proof of concept, a process will be found for it. I don’t think that the innovation process itself is an obstacle. You take an idea, evaluate it, judge it, and decide if it is worth it or not. This is the process, and everything else follows. If you don’t have money, you can borrow it and if you don’t have the expertise you can bring them. The innovation process doesn’t really need an SOP, but you must work on how to make people generate innovative ideas, fear less, and think commercially. You need to incentivise and reward people even for silly ideas but also find a way to filter out copycats.”

Participant JO-CS3-6 gave a similar opinion about the importance of the commercial side for generating innovative ideas:

“A company can identify its needs, especially from the market perspective. Innovative ideas can be identified externally from the environment or internally from repeated mistakes or changing the traditional way of work that is not leading to growth and look for new ways.”

These perspectives give more weight to the commercial value and viability of an innovative idea and its applicability in the market than having a systematic process and the necessary resources for it. This implies the assumption that resources and the infrastructure for innovation are secondary factors in comparison to commercial viability. Contrary to studies that were conducted with a focus on the biotechnology industry in the West (e.g. Simba and Ndlovu, 2014), evidence from JO-CS4-1 and JO-CS3-6 shows some level of dynamism and flexibility of SMEs in the pharmaceutical sector in the MEA region in terms of establishing internal processes to manage innovation and

their belief that resources that are needed for innovation can be easily secured if commercial viability is proven.

Participant SA-CS1-1 puts a very pragmatic point of view about the driver of innovation:

“The best way to describe the innovation process is to start backward so that we don’t get lost, at the end we need to reach the market, so we need to know what the market wants. From the market needs, we go backward. For anything to succeed, it must have a justification for existence. Ideas come from the market. Any innovative idea must start from this direction, understand the needs, and go backward to develop it. But if you start with an idea in your mind, it is not enough, because so many ideas can be generated like this and proven scientifically but not commercially.”

Participant JO-CS2-6 gave a similar input:

“This is very similar to the scope of work of the business development department that is specialised in bringing ideas in to feed the development pipeline and trigger research and development, regulatory affairs, and marketing functions to work. If the business development department is supplied with enough resources, then it can conduct proper research, adopt projects, and start with ideas. Once excellent and innovative ideas are identified to make successful projects, the business development department can adopt the ideas and start from scratch and collect all people required for all phases; developing the product, registering it, and marketing it, to ensure the project has moved from A to Z on an excellent schedule and budget and dealt with as a project that has certain financial and human resources and involves certain departments until it reaches the market.”

These are other opinions that support the assumption adopted by many managers in SMEs in the pharmaceutical sector in the MEA that market demand is the driver of innovation and the trigger of the innovation process. This finding contributes to the perception that the innovation process starts with the generation and screening of ideas (Conway, 2015) and establishes a commercial base for innovation, and relates it to actual market needs that are evident in certain regions such as the MEA. This is in line with the argument concerning the impact of economic factors on innovation and these findings suggest that SMEs mitigate the risks encountered with innovation with assurances related to market needs and commercial viability. They also suggest that SMEs consider resources and innovation factors as secondary requirements to innovation and can be secured at a later stage once a commercially feasible innovative idea is identified. Participant EG-CS5-5 suggests other specific triggers of innovation:

“Need leads to innovation. A company can set a target to innovate a medicine to treat a certain disease, and then arrange to attract relevant ideas to be presented and evaluated.”

Surprisingly, managers in the MEA perceive the innovation process in a different manner than what we were exposed to in the literature as a normal gated process (Cooper and Kleinschmidt, 1991; Gassmann and von Zedtwitz, 2003; Schilling 2017). Contrary to the perception that the innovation process is triggered by conception or the science push (Tohidi and Jabbari, 2012); they consider the market need as the main trigger of the innovation process. The innovation process is not central to them to be looked at while working on an innovation project and they focus more on the other end related to the commercial side. Therefore, they start back to front by not thinking about the innovation process first but about the market viability and constraints and then go backward. By this, managers in SMEs in the pharmaceutical sector in the MEA start by looking at how a certain innovative product will be viable and respond to a certain market need and then go back to analyse what it requires to be done. In their social world, the innovation process is not dependent on available resources but is driven by the required output, based on which the required resources are identified and provided. These insights have led to the following proposition:

Proposition 5: The innovation process in SMEs in the pharmaceutical sector in the MEA is triggered and driven by market needs and commercial viability.

4.3.4 Innovation Factors

The analysis of case studies and interviews has identified a few factors that were observed as critical to innovation. Participants prioritised factors affecting innovation differently and were influenced by their functions and their proximity to the scientific, regulatory, operational, or commercial sides. These factors are the following:

4.3.4.1 Human Factor

The most critical factor to innovation that was evident throughout the five case studies was the human factor. Data gathered from participating firms suggests that employees at different managerial levels played a key role in their respective company's innovation projects. It showed that middle/top managers were mostly the reason for the success of their organisations. In CS1's case, evidence gathered from fieldwork and

interviews illustrate how the company realises the crucial role of the human factor in innovation projects and how selecting the right teams to manage innovation can determine the success or failure of innovation projects. This outcome was similar to the information collected from CS5 case, where the team that was assigned to manage the innovation project acted promptly and effectively to resolve issues hindering the progress of the project. The same story was repeated by participant JO-CS3-1 who talked about the positive role of the human factor in facilitating the technology transfer and sharing innovation knowledge when managers assume multiple roles between collaborating companies and play a key role in training and coaching other employees. Participant JO-CS3-1 explained that things can go even further:

“We ended up hiring the manager who was responsible for the technology transfer, and in a way, it was mutually agreed upon.”

Naturally, being involved with the company from the beginning of establishing the innovation know-how and expertise was essential to establishing a mature and successful research and development function at CS3 by this manager. Events at CS1, CS5, and CS3 highlight the importance of teams and committees’ work and joint efforts to perform innovation being a process that involves several functions rather than an individual’s responsibility. They also highlight the need to have authorities and responsibilities of collaborating teams well defined to ensure the smooth execution of innovation projects and the avoidance of any conflicts.

CS2’s case gave another perception of the role of the human factor in the form of teams not working for the same objectives and accordingly creating obstacles that hinder the continuation of innovation. CS2 experienced a change in the team assigned from its partner and that was coupled with a major shift in strategic considerations. Participant JO-CS2-1 explained this by saying:

“I cannot strike a deal with anyone nowadays unless I am psychologically comfortable with them. It is not all emotional, but if something doesn’t feel right, I will not go ahead.”

This perception emphasises the importance of strategic fit between collaborating SMEs and teams within these SMEs and that changes among team members have to ensure the continuation of strategic alignment. It also indicates how strategic

alignment between collaborating SMEs affects the ease and smoothness of innovation networks expressed in terms of psychological comfort among joint teams. The impact of alignment between teams was also evident in CS4's case, but in an opposite direction, where the team selected to be responsible for the know-how transfer from the company's long-term partner played a key role in ensuring smooth and flawless project execution with their counterparts. Participant JO-CS4-1 explained this by saying:

"We were confident that we had the necessary internal capabilities to be able to quickly acquire the know-how related to the in-licensed product and successfully form a joint team with our partners."

Participant JO-CS3-4 highlights some traits that he believes are required in human resources working on innovation projects:

"Human resources with open and big mentalities who are eager to look for information will drive innovation positively. Others who only look for completing their regular work do not drive innovation. Economic factors also play a role in the sense that economically sound people tend to think more about other things. Others who are economically not doing well will limit their thoughts to their immediate expenses and needs."

In addition, the level of competence, qualifications, and commitment of human resources involved in innovation was observed to be instrumental in securing other factors in a manner that ensured the readiness and sufficiency of resources pertaining to innovation. Participant JO-CS4-1 gave a plausible perception related to how the roles assigned to human resources can be established:

"I take my time in building trust with the managers and key employees I work with based on performance, commitment, and achievement. Also, their readiness and willingness to grasp knowledge and learn something new. Once they gain my trust they are assigned responsibilities and authorities that expand their scope of work and involvement. In addition, I feel confident to initiate projects that are dependent on competent human resources because it is not only about them, but also the employees whom they coach, mentor, and develop."

To elaborate more on the role of human resources, participant EG-CS5-4 raised an interesting aspect related to the impact of the human factor on innovation projects:

"To predict our ability to join and benefit from an innovation network, we will depend on the experience of our partner in assessing our human resources"

capabilities to ensure the success of the project. They will not collaborate with us and invest money if they are not sure of our teams' capabilities."

In light of the assessment of these perspectives, there is logical evidence suggesting that innovation teams have to be strategically aligned and work closely and jointly on achieving common and clear objectives. They also illustrate that an organisation's competent human resource is a determinant factor in the perusal and success of innovation projects. This highlights the importance of the proper selection of human resources to be dedicated and assigned to innovation projects, and the need to ensure their ability to learn and utilise knowledge. This view goes some way in providing an alternative view to widely held assumptions about human resources (e.g., basic qualifications and previous experience) to pinpoint the level of due diligence taken in the MEA region to ensure that individuals that are not only skilled but also ready and eager to acquire new knowledge are recruited to ensure a high level of innovation success. These findings extend the literature on the required qualifications of human resources involved in innovation projects (Rothaermel and Hess, 2007; Stuart et al., 2007; Hitt et al., 2010) by emphasising the eagerness to learn and ambition as essential traits to ensure selecting competent teams for innovation projects. The collective approach of how individuals with essential skills for innovation are managed provides insights into the way human resource management is used as a vital link between securing critical factors of innovation and successfully managing innovation projects. Participant JO-CS4-4 explains this concept precisely and highlights the need to change the mind-set:

"Without the focus, commitment, support, and encouragement of all employees and managers, any innovation is doomed to fail. An energetic, dynamic, and creative workforce is needed for the success of the innovation process as the main obstacle to innovation is a legacy mind-set stuck in the old way of doing things. Innovation endeavours should be handsomely rewarded, and failures accepted as part of the development process."

In the same context, participant EG-CS5-1 explained that they took some time at the beginning of their joint project to establish a coherent team from the two collaborating companies. This reflects an understanding of the critical role of competent and coherent human resources teams and the belief that establishing them

at the forefront of innovation projects is a planning step for success. This was evident in the remarks that participant EG-CS5-1 indicated:

“It saved a lot of time in resolving issues and made the project a success story that opened the door for other similar projects.”

In addition to the organisational and structural aspects, other critical factors related to human resources were shaping up across the five case studies, which are the internal will and passion among employees involved in innovation. This was evident in the comments received from participant EG-CS5-6 who said:

“People’s nature, will, belonging, and loyalty are among the critical factors of innovation. Some of our employees are passionate and have confidence in themselves and wish to do something but need someone to help them.”

The same perspective was repeated by participant JO-CS4-6 who explained that the innovation process needs to be managed by *“someone qualified and dedicated throughout the innovation life cycle as a project leader who can drive the cycle”*. A similar point of view was raised by participant JO-CS3-3 who mentioned *“experienced and competent human resources in research and development and regulatory affairs”* among the critical factors of innovation. Another related note was conveyed by participant SA-CS1-5 who explained that:

“Innovation as a definition means you are innovating something from scratch, which means you have to have a very competent lab or a research centre with good, well-trained, competent, and educated people. This is square number one to start.”

Participant JO-CS4-4 added more traits that are essential for innovators:

“Readiness to try new ideas, eagerness to take on new tasks, accepting setbacks, and determination to succeed.”

In a way, this supports the idea that the role of human factors is impacted by the competence and qualifications of individuals, the ability to acquire and share know-how, and the coherence between collaborating teams. These findings contribute to the literature on the role of innovation team leaders (Conway, 2015) to include managing acquiring and sharing knowledge by innovation team members. Thus, the context of innovation in companies such as CS1, CS2, CS3, CS4, and CS5 brings a different perspective related to human factors that combines organisational aspects

and individual aspects. The organisational aspects are dependent on the innovative organisation and include establishing the proper environment and structure while individual aspects are related to employees involved in innovation projects and include the will to learn and succeed. These findings suggest that there are three elements related to the human factor that are needed to ensure that this resource is organised in a manner that allows capturing its value for the innovation process. These elements are organisational, structural, and internal as illustrated in table 12 below.

Table 12: Required Human Factor Elements for the Innovation Process

Human Factor Element	Description
Organisational	Authorities, responsibilities, and duties need to be clearly defined and communicated to all employees involved in innovation projects.
Structural	Human factors need to be arranged in multidisciplinary teams that include all relevant functions to innovation.
Internal (competencies and traits)	Employees need to be qualified, trained, and have a passion for innovation, determination to succeed, loyalty to their organisations, and acceptance of setbacks.

These findings lead to the following propositions:

Proposition 6: Innovative SMEs in the MEA depend heavily on the human factor in the form of collaborating multidisciplinary teams as a critical factor of the innovation process.

Proposition 7: Innovation in SMEs in the pharmaceutical sector in the MEA is driven by qualified and competent human resources with the passion to innovate and the will to succeed.

4.3.4.2 Financial Resources

The effect of financial resources and capabilities was evident in pursuing innovation projects throughout the case studies. Some companies have arranged for sufficient funding through their internal sources and others had to secure that through external funding entities or investors. All the companies that participated in this research

demonstrated that they were determined to satisfy the requirements and conditions to be qualified to obtain the necessary financial resources, which reflects their realisation of the cost implications of innovation and development projects. Moreover, the availability of the needed financial resources was an essential step to providing other essential resources, such as know-how, equipment, and materials.

Participant JO-CS4-6 emphasised the necessity to have sufficient financial resources for innovation by explaining:

“We need to be realistic and understand the financial obstacles that we will face in terms of feasibility and allocating budgets for innovation until we reach commercialisation.”

Participant EG-CS5-6 agreed on the importance of financial resources for innovation, but he believed that financial resources are not an obstacle to innovation and that such resources are available in many countries in the MEA:

“Most of the countries in the MEA don’t have issues in financial capabilities as an obstacle for innovation, but probably they lack the political will for innovation.”

This view was shared by participant SA-CS1-2, who explained that the issue is not the lack of financial resources, but the tendency of most investors towards short-term investments and benefits with low to moderate levels of risks:

“Companies in the pharmaceutical sector do not want to take a high risk in innovation versus the generic industry, where companies know the market they are entering and the expected market share.”

Participant JO-CS2-3 explained a similar point of view regarding risk taking level by financially sound organisations:

“For the financial resource big companies that are financially strong can do this thing and take the risk and they can have a venture capital arm with a separate operation and can look for innovative ideas.”

These opinions draw our attention away from the perception that financial resources are a hindrance to innovation in the pharmaceutical sector in the MEA and confirm that many countries in the MEA have abundant financial resources. Participants argued that financial resources, whether in the domain of the public or private sectors in the MEA, need to be invested and managed according to criteria that comprise will,

knowledge, and risk-taking. The shared views suggest that if a political will exists from the governments' side and knowledge and risk-taking exist from the private sector's side then the available financial resources can be directed to initiate and support pharmaceutical innovation in the MEA.

Participant JO-CS4-3 expressed another point of view regarding the relationship between profitability and innovation:

"There is a contradiction between aiming for profitability in private sector companies and taking the risk of spending a lot of money on innovation that is not always successful."

Another enlightening point of view was shared by participant JO-CS4-4 who touched upon a different perspective regarding risk-taking:

"The commitment and focus of management on the innovation process is the most important factor. The challenge facing management while creating this value is their willingness to cannibalise the existing revenue stream instead of risking existing funds for a less certain outcome. Funds and efforts will inadvertently have to be re-directed from bottom line revenue to the uncertainty of new ideas which may or may not be successful. In addition, most managers are not willing to take risk and jeopardise their careers. For these reasons, the innovation process must be executed in a top-down management style encompassing the whole organisation."

These remarks suggest that the availability of financial resources is not a real issue in the MEA, but to utilise them for innovation requires directing funds through proper paths. These shall address risk, investment terms, setting priorities, and the involvement of external entities beyond private sector organisations in innovation initiatives. This opens the door for the public sector and governmental entities to have a role in innovation, where they can have investment priorities that span a wide range of economic sectors and planning periods. The same story was repeated by participant EG-CS5-3 in terms of setting investment priorities:

"If the priority is profit then it is difficult to have innovation because the space in which people can move will be limited. They will have limited budgets to reach certain objectives. If a certain budget is allocated for innovation, then people will move freely and innovate and have strong ideas and do things that were not done before. Then return and success can happen."

This quote highlights an interesting link between setting investment priorities and allocated budgets on one side and unleashing innovative capabilities of human resources on another side. It will be interesting to have these factors linked in a model that identifies and manages innovation projects. Based on these findings, the following proposition is suggested:

Proposition 8: Innovation initiatives require financial resources and capabilities to be adequately directed and managed in terms of feasibility, risk, and investment terms.

4.3.4.3 Governmental Support

Across the five case studies, the role of governments in supporting innovation was evident. This was explained in terms of having a “political will” towards innovation as indicated by participant EG-CS5-6:

“The political will is a very crucial factor. The political leadership can share its vision with its people to direct them towards innovation and gain their belonging and loyalty and then it can provide financial resources. Innovation is linked to two main aspects; the first is having the money and the second is the political will towards innovation, which will drive all governmental entities to work in one direction to support innovation. We can have so many ideas but what makes a difference is if we put these ideas on the track of the innovation process. The political will can get the needed resources or give you access to available resources in certain entities in the country in a certain time.”

This opening remark highlights a major and critical factor that has an impact on creating an environment that encourages and fosters innovation on the national level in any country, which is the political will of state and government leaders. It indicates that with the power and capabilities they control in their countries they can direct resources and establish the necessary infrastructure that is required for innovation. In addition, the shared opinion emphasises the significant role that different governmental entities can have in terms of facilitating innovation and removing any anticipated hindrances. This role is not limited to providing financial resources or setting investment priorities, but it can impact the provision of other crucial resources as well. Moreover, this perception suggests that political will can utilise diplomatic relations to play a role in linking innovative organisations in the MEA with sources of know-how in developed countries. Diplomatic relations can also be the base for

establishing long-term business relations and collaborative networks that are dedicated to innovation projects. Another similar comment was provided by participant SA-CS1-3 who said:

“We have initially to make a government policy, this is very important. Even if all others are doing their jobs and there is no policy everything will collapse. The second thing is government funding.”

The same story was repeated by participant JO-CS2-1 who referred to governmental support in what he called “support systems” by saying:

“If you have support systems in developing countries innovations will happen. Support systems can include governmental aid, tax exemptions, leasing, and commercialisation.”

These quotes highlight the need to have some crucial steps done on the governments’ side to have their role organised in a way to achieve the desired outcome. This includes establishing a governmental policy, roadmap, and support systems that are directed to develop economic sectors. Such policies and systems are required to establish laws and regulations that govern the innovation process and the relations between relevant stakeholders. Issues related to IP rights, confidentiality, and conflict resolution, which stand as challenges to innovation as stated by many participants, can be controlled by such governmental policies.

Participant SA-CS1-3 gives a higher role and impact to governments by explaining:

“If there is no government plan or strategy, even if all other people are working together, innovation will never happen.”

This quote reflects the direction some governments in the MEA region, such as the Jordanian and Saudi Arabian governments, are following in terms of establishing visions and roadmaps for their countries. It incorporates innovation into these future planning efforts as a driver of economic growth and a strategy to realise the potential of certain industries, such as the pharmaceutical industry.

Participant JO-CS3-2 gave more details about the possible role of governments in innovation:

“A government can launch a research and development centre and each company can participate with its ideas, and the government can provide financial support. Companies can provide equipment that is needed by other companies and employees can start working in such a centre on certain products and this idea can succeed. Our main problem is “affiliation”; employees generally affiliate and belong to their own companies only and if we conduct training courses to change this mentality, we can achieve miracles. We observe isolation between companies in joint events and they don’t truly interact. A major company with a leader who thinks in this manner can lead such an effort, but we usually await governments to impose such initiatives on us. This can be also proposed in meetings of the pharmaceutical manufacturers association and if large companies accept it others will accept it too. If a general manager in a company accepts it all other managers will accept it too. We might fail at the beginning but later on, we can succeed. Companies will start to think that instead of failing individually we can succeed together in producing one product.”

These quotes suggest that governments are expected to provide different types of support for SMEs in the pharmaceutical sector that are pursuing innovation projects. This can be in the form of a political will that drives all relevant entities to facilitate innovation requirements, governmental funding, access to existing or attainable resources and capabilities, and preferential laws and regulations for innovative organisations. Ambitious governments in the MEA that are known for their endeavours to be the pioneers in certain fields, such as the governments of Saudi Arabia and the UAE, can be potential candidates for assuming the leading role in innovation initiatives. These can be part of long-term plans established for their countries concerning development initiatives for the industrial sectors in general and the pharmaceutical sector in particular. Another highlighted role for governments is creating an environment that widens the sense of affiliation from the individual SME domain to the industry or national domains. This is anticipated to encourage and facilitate innovation networks and joint efforts that can achieve collective success. The shared quotes suggest an interesting tactic for achieving this goal by focusing on the heads of SMEs to instil this characteristic and they in turn can disseminate it and influence a positive change among their teams. Based on these suggestions, the following propositions are offered:

Proposition 9: Ambitious governments in the MEA can assume leading roles in innovation initiatives in the pharmaceutical sector in their own and other countries in the MEA.

Proposition 10: Innovation in the MEA can be established based on cooperation protocols between research institutes, universities, industrial organisations, funding agencies, and regulatory bodies and supervised by relevant governmental entities.

4.3.5 Innovation and Networking

The relation between networking and innovation is analysed according to the following aspects:

4.3.5.1 Importance of Networking to Innovation

Networking is often conceptualised as a precursor to innovation. Participants across the five case studies agreed one way or another that networking is crucial for innovation because most importantly it leads to sharing the risk of innovation and providing comprehensive resources and capabilities. They indicated that shortages of innovation capabilities, or enhancements of existing capabilities, can be dealt with through acquiring the necessary skills or collaboration with external entities that can complement missing capabilities and provide essential resources. Participant EG-CS5-6 summarises the impact of networking on innovation as:

“Networking helps organisations bridge the gap in innovative capabilities by being exposed to the proven know-how of their partners.”

Participant SA-CS1-1 highlights the importance of networking for innovation by explaining:

“Innovations can never be done unless networking and coalitions are performed, whether locally or internationally. Universities have good ideas, but they don’t have the facility to implement them. We have a facility to manufacture products, but we don’t have many ideas. Sometimes we both don’t have money. Some other parties might have money and don’t know what to do with it. For sure there must be networking and cooperation, locally and internationally, and you will always find a need for them.”

These opening remarks reflect the opinions of participants who perceived networking with external entities to develop innovative capabilities to the level that experienced

partners have reached. They also support the concept we were exposed to in the literature that innovation is by necessity a networking process (Rothwell, 1994; Leenders and Dolfsma, 2016). Participant JO-CS2-3 elaborates on the reasons why networking is essential for innovation:

“In a network, you spread the risk between the partners, and you will have more than one eye on the subject. The factors of innovation will have a better effect on innovation and the innovation process in a network because there will be a collective experience from more than one side directed towards the result. In a network, the innovative idea will be given more push, experience, and perspectives to become a reality.”

This quote refers again to the risk factor that was identified initially as a hindrance to innovation and emphasises the role of networks in mitigating the impact of this hindrance; a major benefit of networking for innovative SMEs.

Participant JO-CS3-3 added more benefits of networking for innovative SMEs in terms of the cumulative experience and joint effect of the resources shared by network partners:

“In a network, there will be additional knowledge that is obtained from partners and the capabilities will increase in terms of financial resources, talented human resources, and long experience in procedures that we can benefit from.”

Participant JO-CS3-4 repeated the same points, but added more reasons to join forces:

“In case of a network the time needed for innovation will be shorter and resources will be shared and accordingly less impact and risk will be there on individual companies. Addressing health authorities as a network will be stronger than individual companies.”

The views about how SMEs perceive the advantages of networking within the context of the pharmaceutical industry in the MEA suggest that the impact of innovation factors, resources, and capabilities will be increased in the case of networking and will drive innovation positively. The fact that many participants have identified the unique strengths or contributions that different network members can bring to an innovation network reflects their beliefs that networking is an effective strategy to integrate resources and complement capabilities towards achieving common innovation goals. This view extends the literature on networking being a tool to merge separated knowledge (Leenders and Dolfsma, 2016) by highlighting access to specialised

knowledge as one of the reasons why pharmaceutical managers in the MEA consider networking. Moreover, and in addition to capitalising on bigger resources and shared risks, networks of SMEs in the pharmaceutical sector can have more impact and influence on governmental entities and regulatory authorities to facilitate the major challenge of innovation-related regulations.

To investigate the indicators of alignment between network actors, participants were asked about the impact of language fit, cultural fit, and strategic fit on collaborative networks. Almost all participants agreed on the importance of strategic fit between collaborating partners and gave their justifications. Participant SA-CS1-1 started with this comprehensive point of view:

“Language fit and cultural fit are becoming less important in the current era because we became international, so we will understand each other. We also know the culture of each other. But the biggest weight I will give to strategic fit. Do our strategies meet or not? Agreeing on strategies plays the most vital role in any networking or project. If our strategy matches that of a company on the far west coast of the USA, we will find a way to understand each other and overcome any cultural differences between us, but the opposite is not true. If we both talk the same language, and we are brothers, and they have a different strategy we will not move one step.”

Participant JO-CS2-1 gave a similar opinion:

“Language fit is not a problem anymore, cultural fit is not also a problem because the world is becoming like a small world but both parties need to respect each other’s culture and it is not a barrier anymore. Strategic fit is important because our strategic objectives must be aligned and we have to go in the same direction. It would be difficult that each partner is implementing a different strategy and then in the end we find out that we didn’t achieve our goal because everyone has his agenda. So, partners have to have common motives, common goals, and common strategies as strong elements to achieve the partnership objective.”

These quotes reflect an interesting finding of how the strategic fit between partners from different countries can overcome the differences in culture and language, giving priority to ensuring the alignment of this measure over other factors. They also indicate that when strategies meet and are aligned, partners will find a way to overcome other differences that might appear during collaboration. On the other side, participants explained that when there is no strategic fit, even collaborations between local partners are doomed to fail. Participant JO-CS3-2 gave more reasons for strategic

fit as an important measure for networking to succeed and touched upon the impact it will have on utilising the common resources between partners for the success of innovation projects. He also gave the second priority to cultural fit for its possible effect on agreeing upon the scope or methods of working together:

“Strategic fit is more important because we must be aligned in knowing and employing our resources and understanding our positions in the project. Other aspects related to language and culture are not important. The second level of importance I would give to culture because we might refuse certain products due to culture and differ from our partners.”

Participant Jo-CS4-2 gave a similar opinion regarding the importance of strategic fit and gave some insights on what it entails to the collaborating partners because of having aligned strategic goals:

“The strategic fit is the most important to determine the success of a collaborative network because you need to have aligned goals. When you enter a network you need to understand and share the same goals, otherwise, you should not be in the collaborative network. An organisation also needs to know how they intend to accomplish the goals and contribute positively to the network and take away from it in the right way.”

Collectively, these quotes reflect a mature level of perception of alignment measures between collaborating partners and highlight the focus of pharmaceutical managers in the MEA on the fit of strategic directions as the most important measure. This also emphasises how they believe that strategic alignment is directly related to innovation being a strategic choice and a high-level initiative to be pursued by any organisation.

To elaborate on the measures that are needed to ensure the alignment between collaborating partners, participants were asked about the potential sources of conflicts in a collaborative network. The feedback was diverse and indicated some actual cases of conflict participants faced with their partners during different networking projects. Participant SA-CS1-1 highlighted conflicts related to the relative position and control exerted by partners in a network:

“If a partner feels that they have the upper hand in any aspect, they want to be in control, or if they want to be the leaders in the network and we as the followers, then this will create a conflict.”

A similar impression was conveyed by participant JO-CS3-3 who added another aspect of potential conflicts related to utilising power to direct the relation towards the benefit of one partner over the other:

“Conflicts may arise from the better position to negotiate on many aspects because of other partners’ power, know-how, and resources, which will be more than ours and they might use this to impose things against our will or benefit. They might take the project completely to their benefit more than us.”

These quotes reflect the impact of the cultural aspect in the MEA that implies perceiving networking partners as peers and of equal importance within a network, hence causing conflicts when treated differently. Other participants highlighted issues related to lack of trust, securing the confidentiality, and the attempt by some partners to get more benefits than others as possible sources of conflicts in a network. Participant JO-CS3-1 explained this by saying:

“Conflicts can happen if there is a problem in trust due to issues related to people not adhering to the confidentiality of the information and due to the lack of interest of having a win-win situation and looking for a win-lose situation.”

Participant JO-CS4-3 had a similar opinion regarding the sources of conflicts in a network and started suggesting solutions to prevent such conflicts:

“Conflicts happen if our interests, objectives, and decisions regarding where to spend the resources are different and when the value that we want is different from theirs. This can be avoided by all partners knowing very well what they want from the project and ensure they see eye to eye on the benefits.”

Participant EG-CS5-5 suggested more solutions to the conflicts predicted from his side:

“There are two possible sources of conflicts: timeline and responsibilities. If we are clear from the start on these two points, I think conflicts will be avoided. Timeline refers to putting timeframes for each stage for all companies to agree upon. We might be working at different speeds, so we need to have a clear timeline. Responsibilities are needed for managing financial resources, machinery, equipment, workplace, cost factors, and for who has the upper hand and decision making.”

This quote provides some solutions to possible conflicts by identifying responsibilities and aligning the timeframes for performing different stages related to joint activities and addresses the need to have authority for decision-making clearly stated. Other participants agreed that the most practical measure to prevent possible conflicts

between partners in a collaborative network is to have contractual agreements beforehand where all objectives, responsibilities, authorities, timelines, control measures, and other critical issues are stipulated and agreed upon. Participant JO-CS4-6 explains the impact of having an agreement on avoiding conflicts:

“If these aspects are not clear in a contract or if the activities and timelines are not clear and fixed and parties are not committed to identified timeframes then this might be a source of conflicts. Budgeting, financial responsibilities, and royalties are important things that need to be determined from the beginning.”

Participant EG-CS5-4 elaborates more on the benefits of having contractual agreements and suggests practical ways for their preparation and application:

“Conflicts can happen if the role of each actor is not fully identified from the start or left as vague or if certain duties are left without assigning the responsibility. Each step must be identified in terms of responsibility. Uncertainty and agreements that are not documented or vague or not reviewed well will be sources of conflicts. This can be avoided by studying agreements very well and as a first timer you need to take your time for this and bring consultants from outside the network to make sure of the correctness of the agreement before entering such a network and investment.”

These views confirm the importance of proper preparation before entering collaborative networks and highlight the issues that need to be addressed by network actors to avoid potential conflicts. They also reflect how partners from the MEA countries perceive sources of conflicts that can arise from differences in experience or superiority of their counterparts from developed countries. Most participants believe that well-prepared and sound agreements are sufficient and effective to prevent potential networking conflicts.

4.3.5.2 Composition of Innovation Networks

For the structure of actors in innovation networks, participants were asked about the impact of networking in settings that involve actors from developed and developing countries on innovation. Participant JO-CS3-6 explained the benefits of having actors from developed countries in an innovation network in the MEA:

“Concerns are similar inside the same region, capabilities are very close, and way of thinking is very similar, so inviting new ideas from developed countries can generate new technologies that can be shared, and this networking will have a better impact on innovation. But from the same culture inside the MEA and due

to the similarity in the type and scope of business and the nature of generics it will be difficult to generate new technology.”

Participant JO-CS4-3 had a similar point of view but believed that having partners from developed countries is a must in innovation networks:

“The impact is very positive; actually, it will not work otherwise. Because if you network with local players, they will all have what you have, the same problems and the same solutions, which will not get anybody anywhere. For networking to be beneficial it must have players from different walks of life.”

These views highlight the fact that managers looking to participate in innovation networks are more inclined towards networking with partners from outside the MEA region. They claim that partners from inside their region will have limited contributions to innovation networks due to the lack of previous innovation experience. They also believe that their anticipated partners should be independent of the regional circumstances and conditions that are considered a limitation to developing innovative capabilities.

Participant EG-CS5-4 added another dimension to the structure of actors within innovation networks:

“The best setting depends on my role in the network and my objective. If I will be actively participating in the network, then it is better to network with actors from developed countries for their experience and they will be able to help with the know-how transfer so that later on I can perform innovation on my own.”

More perspectives about the expected benefits from network actors from developed countries were added by participant JO-CS4-6:

“Networks with actors from companies in developed countries (especially certified and reputable companies) will be more effective because from a regulatory point of view the registration of innovated products in regulated markets, launching, and marketing will be faster in this case and customers will have trust in the product.”

These opinions suggest that for innovation networks to be beneficial and effective, they are better to include actors from developed countries who have experienced successful innovation projects. Such actors are expected to provide proven innovation know-how and have the influence to facilitate the regulatory issues related to innovated products. The inclusion of such actors in innovation networks in the MEA

was positively perceived by most of the participants across the five case studies. However, the inclusion of such actors with normally superior levels of knowledge, experience, and financial capabilities might lead to compromises by local actors in terms of interests and identities. This relates to the views some participants conveyed regarding their expectations to be treated like peers in such networks regardless of the obvious differences in capabilities. This issue has an impact on the local partners' contribution and involvement in innovation networks and reflects a cultural norm that is unique to the MEA in terms of the avoidance of being perceived as inferiors to others or taken advantage of. When asked about this issue, participants suggested several ways to maintain their interests and identities and minimise the chances of possible conflicts. Participant JO-CS3-3 suggested the use of upfront agreements to have a contractual base for managing the work of innovation networks:

"This can be done through agreements that will govern the project timeline and everything that will take place between partners. If the agreement is clear and our interests are stated correctly, then the plan or strategy that the agreement was built on will not be lost even if the partner has power. If you control the agreement as you wish, then you can protect your right and get the benefit."

Participant SA-CS1-3 gave a different point of view regarding this subject:

"This compromise is like an attraction to those who have the know-how, funding, and other essential resources for innovation."

A similar opinion was expressed by participant JO-CS3-6:

"Companies must be prepared with time, resources, awareness, and training and prepare employees to expect external contacts with big companies and run after them to obtain what we want. They can easily find other partners, but we cannot. There needs to be a culture and awareness that employees are working for their own and their company's benefit in a race and to avoid resistance. If you contact a partner of this sort without preparing your company, it will be resisted and will fail. So, the company has to be internally prepared if it wishes to take networking as a strategic option for growth and innovation. In such settings, your identity will grow when you put your company's name on a product next to a leading company and your image will be stronger. Other companies eagerly show and promote collaborations, even small ones, through publicity and public relations."

Another quote in the same context was given by participant JO-CS3-3:

"If as a company I am offered this opportunity with these limitations I will go for it to achieve certain objectives. I will let them use me for a certain project for my

benefit to create other projects. I will lose at the beginning, but I will eventually gain.”

These opinions highlight an interesting aspect related to the readiness of SMEs in the pharmaceutical sector to temporarily take a secondary role in innovation networks and offer compromises, if needed, to facilitate their involvement and participation. This suggests that building innovative capabilities for these SMEs in the long term is more important than temporary flexibility and tolerance regarding their internal policies and interests.

Nevertheless, participant JO-CS2-1 suggested practical ways to counteract negative signs of superiority by actors from developed countries and maintain the interests and identities of local partners:

“Firstly, all aspects must be controlled through clear legal agreements for both parties, and for this you will need to have a strong legal partner. Secondly, superior partners must know that we have an added value, feel it, and see it. So even as smaller partners, we need to have a dynamic pipeline, dynamism at work, and methodological approach to make our superior partners feel our importance.”

These remarks suggest practical solutions for maintaining the identities and interests of SMEs in the MEA getting into innovation networks with superior actors from developed countries. They all involve having contractual agreements that stipulate the roles and rights of all parties and they emphasise the need to negotiate and agree on all terms upfront. However, there was a clear indication that many participants across the five case studies gave more weight to the advantages of building innovative capabilities by working closely with such experienced actors than the disadvantages of adversely impacting the identities and interests of local actors. This leads to the following proposition:

Proposition 11: SMEs in the pharmaceutical sector in the MEA give more weight to the benefits they expect to gain from superior partners than the loss of interests or identity. They manage this concern through sound contractual agreements.

4.3.5.3 Impact of Social Capital on Innovation

Managers at CS1 utilised their connections in a number of ways to initiate the company's efforts to develop its innovative capabilities. However, CS1's case shows an example of the importance of checking the previous history and experience of potential networking partners before establishing innovation networks. In this case, the major changes the company did while preparing for acquiring the know-how of an innovative product; a bio-similar, have fallen short of investigating the competence of the selected partner to provide the required technology. Participant SA-CS1-1 explained the reason for this:

"It seems we have trusted our partner too soon and missed doing our job in checking their previous track record of similar projects. It was too late when we found out that our partner has never completed a full project before."

This experience has left CS1 with a strong belief in the need to evaluate potential networking partners thoroughly as part of the preparation to enter a network and benefit from it to build innovative capabilities. Contrary to CS1's experience, CS3 and CS5 utilised their previous history of working with external partners and built trust and knowledge of their capabilities in establishing further forms of collaboration.

CS4 had a slightly different consideration while deciding upon acquiring know-how and in-licensing a product from an external source, which is the need to handle the liability and responsibility as the marketer of a pharmaceutical product that was developed by another party. The decision was highly impacted by the long-term relationship CS4 had with its partner and the level of mutual trust the parties have reached. Participant JO-CS4-1 described the relationship between the owners of the two companies as *"close friends and almost like family"* and he thought that CS4 probably would not have taken this step if it was with another partner. This case emphasises the impact of trust and long-term business relations as aspects that facilitate challenges that might be faced during innovation. It also shows that business relations turn into personal ones and become part of the social capital of business owners and investors in the MEA and that such capital is utilised for advancing innovative capabilities. Participant JO-CS4-1 clarified that the relationship with their partner still stands today and is extended to

the second generation of the families running the business. He explains this further by saying:

“We had a long history of flawless business relation with our partners that turned into a personal relationship and was the basis for building trust and the reason we took the responsibility of in-licensing their products in Jordan and exploring more ways of effective networking.”

Similarly, the history of partners and its impact on networking was evident in CS5’s case as explained by participant EG-CS5-1:

“Our partner MNC1 was well-known for establishing and running successful networking projects which was a key factor for us to enter into multiple joint development projects with them.”

CS2’s case emphasises the need to create awareness among potential networking partners to ensure the alignment of mutual objectives, the provision of necessary resources, and setting of expectations in terms of development projects’ timelines and output. Participant JO-CS2-3 describes another element to be added to the awareness that is expected from potential partners:

“The main hindrance to innovation is the restricted access to smart capital (not financial capital like a bank loan) that motivates innovation. Smart capital means capital with experience.”

Another similar example was mentioned by participant EG-CS5-1, who stressed the importance of awareness for partners by saying:

“We need to create the awareness for investment banks regarding innovation in the pharmaceutical industry to facilitate their participation in such cooperation”.

This aspect is related to the absorptive capacity of potential partners and their ability to learn about the business of companies they partner with to ensure they positively contribute to the success of networks.

Contrary to CS2, CS3’s case was different in the sense it initiated its networking experience by depending on the social capital of its board members. The long-term relations one of the board members had with some development experts and the trust he had in their knowledge and achievements paved the way for establishing a network for the ultimate objective of building the research and development capacity in CS3.

The fact that the selection of partners was performed by one of the board members rather than by an external consultant had a two-dimensional impact on the success of the network. One dimension was the trust the other board members had in the nomination done by their colleague and accordingly the facilitation of establishing the network. The second dimension was the responsibility the development experts felt being nominated for the partnership by one of their contacts, which made them more eager to succeed in their assignments. Participant JO-CS3-1 explained this by saying:

“One of our board members recommended acquiring a share in an external CDO based on his previous experience in dealing with them and the track record they had. It didn’t take the board members too long to enter this partnership because they trusted the selection done by their colleague and they knew that he was always available and ready to assume the responsibility to make this experience a success.”

Emphasising the need to review the history of networking partners, CS5 highlighted the long experience their partner; MNC1, had in mergers and acquisitions and that was evident in the success of their innovation network and the development of some internal processes at CS5. Participant EG-CS5-1 indicated that he is considering more development projects in other fields with MNC1 to capitalise on the success achieved and maintain the strategic relationship they had established. CS4 had a similar situation to that of CS5 where it depended on its previous relationship with a long-term partner to establish a new frontier for cooperation in terms of know-how transfer. Contrary to the experiences of CS5 and CS4, CS1 realised the importance of checking the track record of partners at a late stage of a networking project. More on this aspect can be noted in the quote from participant JO-CS4-4 who said:

“If you have a positive record of previous innovations then you are more likely to attract investors and will have the capital to do what you want to do. But if you lack trust, track record, and capabilities then getting in investment is going to be very difficult whether from private or governmental sectors.”

The impact these experiences had on innovation highlights the need to include reviewing and evaluating the history of potential partners during the preparation stage of networking. It also suggests that having a proven track record of innovation is an advantage to being selected as a member of innovation networks and having better chances to succeed in them. This leads to the following proposition:

Proposition 12: SMEs in the pharmaceutical sector in the MEA select their networking partners based on a proven track record of innovation experience and their own history of dealing with such partners.

4.3.5.4 Informal Networks in the MEA

Across the five cases, there was clear evidence that there was a form of networking that was shaping up. This form contributes to the literature on informal networks (Jones et al., 2001) and has a contextual setting that is more relevant to countries in the MEA region. The evidence collected from the case studies ascertains that this form of networking is strong, trusted, and utilised for making crucial decisions and may be perceived as more valuable and influential than formal networks. In a discussion related to a question about how certain critical issues are debated or discussed in a company, participant JO-CS2-1 highlighted that:

“I have my network of contacts that I trust and respect, and I frequently consult them on issues related to our industry. I give a high value to these informal consultations because I believe there is no direct interest behind them. This form of networking is very important, and I depend a lot on it and have benefitted from it.”

The same story was repeated by participant JO-CS4-1, who added another dimension to informal networks:

“I can establish such informal networks with individuals from other countries or cultures, but not as fully as I would regard local people from my own country or culture due to the barriers and the circumstances we live in.”

These managers explained how they build their networks in their different ways. This means that these people are engaged in a different type of networking than the one we are traditionally exposed to in the literature (Jones et al., 2001). Evidence from fieldwork provides some indication that informal business networks in the MEA, particularly in Jordan, take a different form where there are industry experts who are known and trusted for their vast experience and sound judgement and who are occasionally consulted on critical issues that industrialists face. While such services are usually considered paid services, these experts mostly offer their advice for free and as explained by participant JO-CS4-1:

“They consider this as part of their role in serving the industry, maintaining their relations with the industry leaders, and strengthening their position as industry experts.”

Some members of these informal networks consider these services as favours that will be paid back in one way or another in the future. Moreover, according to some key members in these networks, they consider their participation in such networks as a matter of values they believe in and they achieve a kind of self-satisfaction for being recognised as experts and technology references in their countries and region. An analysis of the empirical data suggests that the topics that are usually discussed within these networks are new pharmaceutical products, technical issues, recruitment reference checks, and inquiring about equipment and material suppliers. For example, one of the companies that were studied in this research faced an internal issue related to compliance with technical specifications during the in-process and final inspection stages. The issue was raised by some of the company’s middle managers who were not on good terms with the company’s top management and were looking to create some pressure on them. What seemed like a serious issue then was easily resolved when the top management consulted one known pharmaceutical expert who simply advised to change the inspection methods to the right ones that are relevant to the products to be tested and that would give representative and accurate results. This example shows how informal networks; one form of networking, are commonly utilised in the pharmaceutical industry in the MEA and how they play a crucial role in resolving some of the critical issues any organisation might face.

Observations from this research and from some of the interviews that were conducted indicate that such informal networks in the MEA are characterised by being a blend of professional and personal relationships (Methot and Seibert, 2021). In addition, some consultations within these networks take place away from the business environment or premises as explained by participant JO-CS4-1:

“When I faced a critical technical issue at our factory and thought about the best person to consult, I just called him, drove to his home, and met him there. He was kind enough to cancel an appointment he had when he realised the seriousness of the issue.”

Moreover, with the boundless nature of these networks, innovative ideas are usually freely, transparently, and openly discussed in a manner that depicts what can be considered the MEA's version of Open Innovation (OI) (Chesbrough, 2003; Vicente-Saez and Martinez-Fuentes, 2018). This was evident in the comments made by participant JO-CS2-1 on this form of networks:

"I feel content and comfortable to openly discuss some critical issues within my informal network because I base my relations in it on trust and good feelings."

In many countries of the MEA, it is interesting to observe how issues related to competition, market breakthroughs, and financial superiority have insignificant weights in comparison to the motives of key industry rivals to be actively participating in such networks. Evidence from case studies and interviews with several managers suggests that rivals have immediate interests in their organisations and indirect interests in their industry and country. This leads them to ensure that colleagues working for other rival organisations are informed and aware to take decisions to the benefit of their organisations. These findings imply that the shape and activities of informal networks in the MEA have an impact on competition norms and the individual contribution by SMEs in the pharmaceutical sector to their industry on national levels and to their local economies in general.

Another aspect to be highlighted in this context is the cultural factor related to the tendency and comfort one feels towards consulting other experienced, respected, and renowned figures within an industry's community; the pharmaceutical community in Jordan for example. In the MEA business culture, it is observed that even in cases where industrialists feel determined to take a certain business-related decision; they feel that consulting other experienced industry experts can only bring more benefit and more guidance to take an informed decision. On the other side, the consulted experts feel responsible and obliged to offer their assistance based on the values of helping and sharing knowledge with others. This was explained by participant EG-CS5-1 who said:

"At this stage of my career, I feel it is my duty to support others in the same industry and that is why I recently assumed the role of the president of the union of pharmaceutical manufacturers in Egypt. I also believe that we need to support

students completing their higher studies or doing research work for their benefit and for the positive impact new science can have on our industry.”

A similar point of view was conveyed by participant JO-CS4-4 who added another dimension for reasons to collaborate in the MEA:

“On the positive side, the Arab/Islamic culture/identity should in theory be a positive contributing factor that would impart a sense of solidarity shared between the Middle East nations that could encourage collaboration and innovation. This nationalistic view has certainly fostered innovation in other cultures such as India.”

This creates another sort of connection between members of informal networks and supports trust-building over time through genuine and fruitful exchange of expertise that leads to knowledge sharing among network members and beyond (Lee et al., 2010). One additional observation about these informal networks in the MEA is the power and influence they have within an industry’s community in a manner that creates an informal industry association where membership is associated with trust, transparency, and sincerity. This was explained by participant JO-CS2-1 by saying:

“The relations within this network are strong and genuine because they are based on good relations and trust and there are no interests to be gained. I feel comfortable taking decisions based on consultations within my informal network.”

These findings and observations extend the literature on informal networks as they show a different dimension that is solid, unique, and context-sensitive and offer the following proposition:

Proposition 13: Informal networks in the MEA are based on personal relations, trust, and respect and are consulted for making crucial business decisions.

4.3.5.5 Open Innovation (OI)

Participants across the five case studies were concerned about the concept of OI and it was interesting for most of them to think about how they can benefit from it in their environments. Participant SA-CS1-1 had this opening comment about OI:

“From cultural aspects, I doubt we can benefit from open innovation in the MEA. We can overcome this by having good examples. By having cooperation regarding a certain idea and then it succeeds, and reward is shared among all participants. But still, this doesn’t happen directly, and it will still need time. You can break the

barrier with good examples, real examples, and time. When we talk about changing culture, we talk about time and practical things. “

Participant EG-CS5-1 had a similar point of view:

“This concept needs some work to be successful in the MEA. This can be started by changing education in schools and encouraging working together on projects. You can also send people to study abroad out of the MEA region to learn the culture of networking. You need also to use the media to change the culture. You can also share success stories of networking.”

These remarks highlight the cultural obstacle against OI in the MEA due to the mistrust some organisations might have of others and the fear of losing competitive advantages related to industry secrets and research breakthroughs. Many interviewed participants were reluctant to adopt such a concept for the lack of known and previous successful examples. However, other participants believed that this obstacle can be resolved and gave some suggestions in this regard by sharing successful stories of OI in similar companies and under comparable circumstances. In their opinions, seeing how OI has worked for others will encourage the implementation of this concept in the MEA.

Participant JO-CS2-1 added another perspective to how OI can work for SMEs in the MEA:

“SMEs can benefit from this concept, and they can join forces but this has to be governed by laws and regulations and have the proper infrastructure.”

This was supported by participant JO-CS4-1 who added:

“A legal infrastructure is needed in the MEA region that can protect and foster open innovation.”

These quotes indicate the importance of laws and regulations to participants who are willing to consider the implementation of OI in their organisations. To them, they provide sufficient security to safeguard their trade and research secrets and provide a legal ground for any unforeseen conflicts. In addition, they believe that laws and regulations can govern such sorts of collaboration, especially concerning IP rights.

Participant JO-CS3-1 gave more practical steps for OI to succeed:

“Owners in our region would never accept this concept, but their second generations who are more open to think can accept it. Sometimes you can use

tools to overcome obstacles against this concept, such as added job security for employees and removing people and groups that resist and fight change.”

This point of view indicates the difference in mentality and openness between different business generations in the MEA region. It explains that older generations, who were usually the founders of business entities, are more conservative and might resist OI, while newer generations would be more willing to adopt such a concept. This view highlights a link between the implementation of OI in the MEA and the prevailing traditional norms of conducting business in the MEA and it shows signs that business norms are changing towards more acceptance of OI.

Participant JO-CS4-4 had a comprehensive opinion about OI that encourages the implementation of this concept for the foreseen advantages, especially in terms of minimising cost and risk. This opinion is in line with the findings that relate to SMEs taking precautionary measures to mitigate anticipated innovation risk and cover the required financial resources. Accordingly, this suggests that OI offers the opportunity for SMEs to approach innovation in a manner that satisfies their concerns and secures critical innovation factors. This point of view was explained as follows:

“The advantages of open innovation and science far outweigh the disadvantages. In the traditional closed innovation model where the company keeps the IP or core expertise out of external reach, exercising complete control over it, while making large research and development investments, paying for IP filings and maintenance leading to slow/lost innovation, higher risk, and lower market share. The closed innovation model also results in far fewer end products because of the filtering process of the ideas/project at various stages of development from initiation to implementation. In contrast open innovation, although has its own set of managerial/financial challenges, invariably leads to greater benefits for business partners. Greater speed is a major advantage because companies can bring in the missing expertise rather than riding out the learning curve. The number of successful end products is also higher because of the greater collective expertise presented by the collaborating parties.”

Overall, the findings generated from the case studies suggest that for SMEs in the pharmaceutical sector in MEA one of several open innovation models can be adopted. Collaborative research with universities, scientific institutes, suppliers, and even peer companies are all viable options. A network of partners can have joint research and development and mutually have access to IP to create new joint ownership IP. This

model can be cost-effective in terms of research costs and lead to competitive marketing advantages and new revenue streams. In-licensing relevant IP from experienced third parties is another sort of open innovation accelerating in-house development projects. This ascertains the need to select networking partners based on previous history and a proven track record of successful innovation.

In all the innovation models above, the advantage is that teams of knowledgeable people are brought together, directly interact, and openly exchange ideas for conducting research leading to establishing internal knowledge faster. This highlights the importance of recruiting teams of knowledgeable employees with different fields of relevant experience to participate in OI ventures. Joint Ventures, acquisitions, or mergers are also options for extending innovation in two successful complementary companies since the sum will generally be greater than the parts. However, the success of these models depends on an initial discussion and agreement on intellectual asset management, which indicates the need to have OI ventures contractually bound between collaborating parties. These views have led to the following proposition:

Proposition 14: Critical success factors that underpin OI in the context of SMEs in the pharmaceutical sector in the MEA comprise IP laws and regulations, contractual agreements, knowledgeable employees, partners with a proven track record, and sharing previous success stories.

CHAPTER 5 – DISCUSSION

5.1 Overview

This chapter capitalises on the findings illustrated in Chapter 4 to suggest the means to mitigate the challenges confronting innovative SMEs in the pharmaceutical sector in the MEA. It elaborates on the way networking can be utilised by such SMEs to secure innovation factors and establish the base for a model to manage and guide the innovation process. Moreover, the chapter identifies the innovation stakeholders within the context of the pharmaceutical industry in the MEA and suggests a framework that integrates their contribution to pharmaceutical innovation projects. In addition, the suggested innovation model is anticipated to extend the research on collaborative networking by emphasising the unique contextual factors that guided the establishment of the model and hence providing the opportunity to explore and account for innovation and networking in variable contexts.

5.2 A New Model for Collaborative Networking

A model for collaborative networking is suggested to serve the case when an SME identifies a market need for an innovative product and embarks on an innovation project by depending on its internal resources. With the progression of time, the need for some resources will increase beyond the capabilities of the innovative organisation, pushing it to seek additional resources from external sources (Chesbrough, 2003; Dogan, 2017). Accordingly, the need arises for collaboration, integration, and networking with other organisations that own resources and factors that complement those of the initiating organisation (Granovetter, 2018). This networking acts like a group of cogs that need to interact and move together simultaneously and smoothly so that the overall integration forms an engine that drives the innovation process forward through its identified phases. The use of cogs is meant to indicate the significance of alignment between network actors and to relate this alignment to the identified factors of impact on innovation and networking. The degree of successful integration and alignment of the cogs and different parts of the engine depends on factors pertaining to culture, human factors, financial resources, laws and regulations, comprehensive awareness, mutual trust, and know-how. These factors need to be integrated, synchronised, and aligned in

a way that ensures smooth movement of the cogs and hence an efficient and effective operation of the collaborative network. This situation reflects a strategic fit (Nielsen, 2010) between collaborating organisations and accordingly an effective arrangement to incubate and execute the innovation project.

In addition, the collaborative network operates in a larger innovation framework that comprises funding agencies for the provision of additional financial resources, regulatory bodies for the establishment of flexible innovation laws and regulations, and research institutes that create the required know-how. As an additional pillar of this framework, the social capital of network actors plays a key role in advising on the proper mechanism to operate the network and execute the innovation project. This framework is supervised by ambitious relevant governmental authorities that provide political support and ensure the coherence of these interacting entities and the facilitation of securing additional needed resources for the innovation project. Moreover, governmental authorities provide support systems in terms of governmental aid, tax exemptions, leasing, and commercialisation (Faber et al., 2008; Lee et al. 2012).

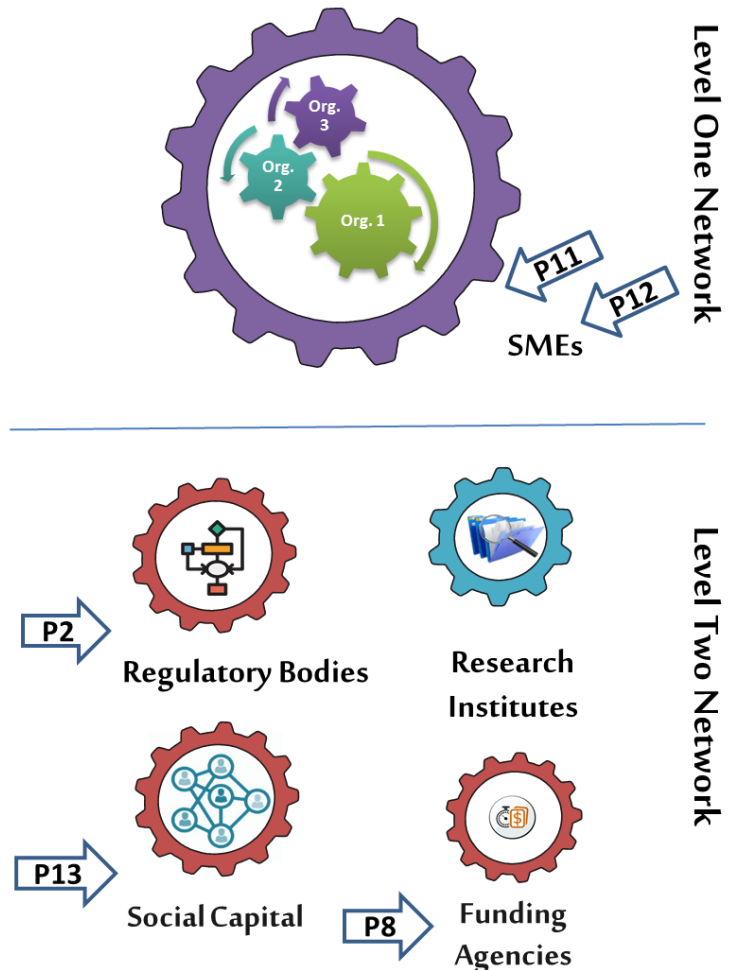
The proper movement and synchronisation of the inner cogs reflect a smooth collaboration between the actors of the innovation network and indicate a synergetic utilisation of the shared resources that collaborating organisations bring to the network. This results in a stronger force on the outer circle elements, such as the regulatory bodies, causing more influence in facilitating any challenges the innovation network faces. For example, regulatory bodies can be more flexible in establishing innovation laws and regulations that allow for more creativity by SMEs in the generic pharmaceutical sector embarking on super generics projects (Barei et al., 2013; Lee et al., 2016). Moreover, the resulting force can encourage funding agencies to be more responsive to the funding needs of collaborating networks, ease financing requirements and conditions, and provide the necessary financial resources with realistic and achievable conditions. Similarly, research institutes will give priority to coherent networks in directing their resources and scientific efforts. The contribution of social capital will be more effective and more readily available when collaborating organisations are synchronised, coordinated, and act together to utilise their informal

networks and bring together external diversified expertise to add value to their network (Jones et al., 2001; Granovetter, 2018). This impact on elements of the outer circle cogs will in turn result in an enhanced movement of the innovation framework which will attract and motivate supervising governmental entities to enthusiastically support and avail more resources for all participating members for the benefit of innovation. This drives the innovation process further and moves it forward until an innovative product is realised and commercialised.

The characteristics that underpin the workability of this model include the fact that it identifies the stakeholders and entities that are involved or required to contribute to an innovation project that is undertaken by SMEs in the pharmaceutical sector in the MEA. This identification is presented on two levels; where the first level comprises SMEs that are directly and jointly working on innovation and that form the inner circle of the model. The second level refers to the external entities that are indirectly involved in the operation of the innovation project but are needed to provide support or facilitation for its progress and they form the outer circle in the model. These two levels are illustrated in figure 4, which includes a table that illustrates the propositions that were developed in chapter 4 and indicates how the propositions relate to the two levels of networking. The presentation of these two levels is meant to indicate the entities that are included in each level and the sequential operation of the two networks. Hence, the combination and full operation of the two levels will create a comprehensive collaborative networking model that comprise the entities and the factors that are identified to influence innovation in the context of SMEs in the pharmaceutical sector in the MEA as shown in figure 5.

Figure 4: Two Levels of Networking

P. No.	Description
P1	Obstacles limiting a firm's ability to innovate in the MEA require organisational and structural changes in alignment with the operating environment.
P2	Innovation laws and regulations in the MEA need to allow for creativity and commercial viability of innovative pharmaceutical products.
P3	Social barriers can hinder innovation in SMEs in the MEA, and they can be eliminated by removing the gap between upper management and lower levels of employees, encouraging creativity and being more tolerant towards mistakes.
P4	Economies of scale have a significant impact on the feasibility of innovation projects in SMEs in the pharmaceutical sector in the MEA and can be attained through access to wider market networks.
P5	The innovation process in SMEs in the pharmaceutical sector in the MEA is triggered and driven by market needs and commercial viability.
P6	Innovative SMEs in the MEA depend heavily on the human factor in the form of collaborating multidisciplinary teams as a critical factor of the innovation process.
P7	Innovation in SMEs in the pharmaceutical sector in the MEA is driven by qualified and competent human resources with the passion to innovate and the will to succeed.
P8	Innovation initiatives require financial resources and capabilities to be adequately directed and managed in terms of feasibility, risk, and investment terms.
P9	Ambitious governments in the MEA can assume leading roles in innovation initiatives in the pharmaceutical sector in their own and other countries in the MEA.
P10	Innovation in the MEA can be established based on cooperation protocols between research institutes, universities, industrial organisations, funding agencies, and regulatory bodies and supervised by relevant governmental entities.
P11	SMEs in the pharmaceutical sector in the MEA give more weight to the benefits they expect to gain from superior partners than the loss of interests or identity. They manage this concern through sound contractual agreements.
P12	SMEs in the pharmaceutical sector in the MEA select their networking partners based on a proven track record of innovation experience and their own history of dealing with such partners.
P13	Informal networks in the MEA are based on personal relations, trust, and respect and are consulted for making crucial business decisions.
P14	Critical success factors that underpin OI in the context of SMEs in the pharmaceutical sector in the MEA comprise IP laws and regulations, contractual agreements, knowledgeable employees, partners with a proven track record, and sharing previous success stories.



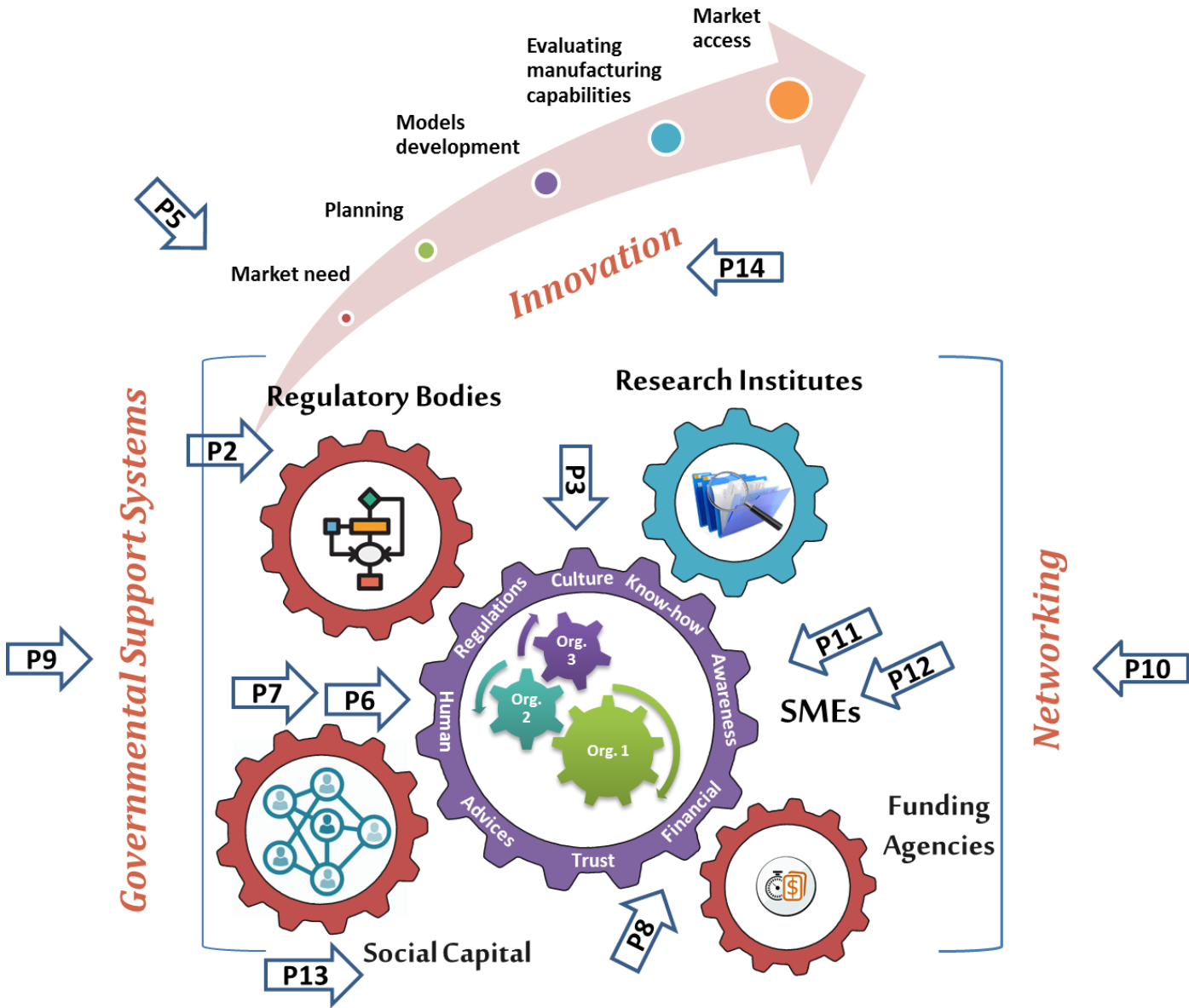
Another fact that determines the workability of this model is that it explains the reciprocal impact between the inner and outer circles and how the proper operation of each affects the other. This is explained in terms of the impact of the synergetic operation of the collaborating organisations in the inner circle on securing more support and facilitation from the members of the outer circle, giving more thrust for the inner engine to operate. Accordingly, this model achieves the anticipated benefit of networking on innovation by identifying all relevant entities, their interrelations, and critical factors and arranging them in a framework that can oversee the progress of innovation thus bridging the gap between conception and commercialisation. In addition, this model contributes to the literature on innovation networks (Jones et al., 2001) by introducing a two-level framework that comprises two dependent and

reciprocal networks and is perceived to fit the context of the MEA region and the interactions between its innovation stakeholders.

This model is a departure from the theoretical framework presented on page 48 in terms of introducing two levels of networks that together establish a collaborative innovation model and incorporating additional entities that play a key role in facilitating innovation networks, such as governmental entities, research institutes and informal networks. Moreover, this suggested model confirms the impact of some innovation factors that were identified earlier; such as the organisational culture, resources and capabilities on innovation while disregarding others factors; such as dynamics of growth and macroeconomic factors, that show insignificant impact on innovative SMEs in the pharmaceutical sector in the MEA. It also presents additional factors of regulations and awareness that are crucial for the effectiveness of innovation and the success of collaborative innovation networks. In addition, the new model emphasises the market need as the trigger of innovation in the pharmaceutical sector in the MEA compared to conception as the starting phase of the innovation process as shown in the theoretical framework on page 48. The numbered arrows on the model refer to the table of propositions that is illustrated in figure 4 and indicate how a proposition is related and reflected on the model.

The suggested model is shown in figure 5 on the next page.

Figure 5: A New Model for Collaborative Innovation Networking in the MEA



Source: Researcher's ideas

This proposed model indicates the entities that are interrelated in an innovation project in SMEs in the pharmaceutical sector in the MEA and depicts how they interact to drive the innovation process. The model illustrates the critical factors of innovation and how they can be secured and managed in a manner to support innovation. This model brings SMEs in the pharmaceutical sector together with external regulatory and funding agencies and proposes a mechanism by which all these parties can operate together under the supervision of governments in the MEA. The model also bridges the gap

between private SMEs in the pharmaceutical sector and relevant governmental sectors, such as regulatory bodies, and forms a framework that establishes a solid and viable innovation network. On the one hand, this model is perceived to serve SMEs in the pharmaceutical sector that embark on innovation projects and seek the support of external entities and the provision of resources to develop their innovative capabilities. On the other hand, MEA governments that work on establishing future roadmaps and visions can use such a model to ensure the positive contribution of the pharmaceutical sector as one vital economic sector in their planned visions. By being part of this model, innovative SMEs will be more able to take risks and afford the investment in innovation projects, thus confronting some of the major challenges facing innovation in developing countries (Tsvetkova et al., 2017; Sharma, 2018).

Additionally, the model allows for the proper monitoring and control of the performance of all involved entities and the periodical follow-up of deliverables and achievements since the operation of each part of the model is critically dependent upon the outcome of another part. Accordingly, the lack of performance of any entity that is involved in the model will be evident and will call for corrective actions from the affected entity and attention from all other entities to ensure the effective operation of the model.

Moreover, the proposed model serves as a motivating tool for participating entities that perceive the model as a comprehensive framework that involves governmental and private entities where the achievements will be recognised and capitalised on for further projects and ventures. This motivation can apply to funding agencies too where successful participation in such a model can attract other feasible financing projects.

Similarly, members of informal networks can gain more recognition and exposure to a wider network of governmental and financial entities that can create opportunities for them to share their experiences and establish more contacts from different relevant sectors. This in turn is expected to strengthen the values they believe in to maintain their positive contribution to such collaborative networks. On the scientific side, by getting direct access to pharmaceutical organisations and funding agencies, research institutions participating in this model will be able to test their inventions and accordingly improve scientific research capabilities on national levels in MEA countries.

With the direct involvement of governments in the proposed model, access to public and social media becomes imperative, leading to creating awareness regarding innovation initiatives and the ambitious goals to be achieved. This can support the elimination of social barriers among the stakeholders of the pharmaceutical industry in different countries of the MEA and open the door for more innovation projects, especially the ones that were confronted with challenges upon their conception.

This model can be the source of success stories of innovation projects that were identified by many participants in this research as one crucial factor to change the prevailing culture against sharing knowledge with others and working openly on innovation projects. Success stories can also remove or minimise social barriers that hinder innovation initiatives on the organisational or individual levels in SMEs in the pharmaceutical sector in the MEA. This in a way extends the literature that highlights trust (Hardwick et al., 2013; Massaro et al., 2019) as the basis for sharing knowledge in collaborative networks and gives weight to success stories to encourage this sort of openness in the MEA.

The structure, components, and roles of actors in the suggested new model establish a link to the concept of innovation systems in terms of the anticipated public innovation support systems and the organisational support from the private sector (Cooke, 2001; Groenewegen and Steen, 2006; Sharif, 2006). Moreover, the argument presented in this chapter concerning the dependency of operation of each network level on the other is a representation of the relationships between innovation stakeholders that explains the performance of national innovation systems (Godin, 2009). The new model also emphasises the need to integrate and coordinate the efforts of different innovation stakeholders on national and regional levels to ensure positive effects of innovation systems (Fromhold-Eisebith, 2007). In addition, the proposed interaction between SMEs, research institutes and relevant governmental entities in the suggested model to incubate innovation relates to the concept of 'Triple Helix' and is in line with its perspective of the future of innovation on national and regional levels (Etzkowitz and Leydesdorff, 2000, p. 109; Cai and Amaral, 2021, p. 217). However, the new suggested model extends the literature on innovation systems by highlighting the institutional,

social, and cultural dynamics at play in SMEs in the pharmaceutical sector in the MEA and by showcasing the factors that underpin the effective operation of such systems within the context of the MEA.

By developing this model, the objectives of this research that included the identification of challenges that hinder the efforts of innovative SMEs in the pharmaceutical sector in the MEA towards innovation, are met. This was achieved by studying and analysing the cases of five pharmaceutical organisations that experienced different innovation projects in three different countries in the MEA. The research was also aimed at studying the innovation process and the factors impacting it in the context of the pharmaceutical industry in the MEA. It also addressed how pharmaceutical managers perceived and weighed the different factors that are critical to innovation through direct interviews with those managers who covered comprehensive innovation-related functions and roles. In addition, the research focused on evaluating the role and impact of networking and strategic alliances on resolving some of the obstacles hindering innovation and limiting innovative capabilities of SMEs in the pharmaceutical sector in the MEA. This was achieved by looking at actual networking experiences and analysing how they progressed in terms of advancing innovation projects. The research reviewed relevant academic literature covering the aspects of innovation and networking and conducted case studies to observe how the research subject was addressed in the field. This research spotlights the limitations of the extant literature in the way it conceptualises networking and innovation. Specifically, the literature overlooks cultural and social differences when it comes to networking in variable entrepreneurial contexts such as those that are known to exist in the MEA region. On the theoretical side, this research is an addition to what is normally perceived regarding the critical factors of networking and innovation (Ross et al., 1999; Seruga et al., 2014; Uden et al., 2017; Alemayehu et al., 2018). For example, the legal framework in the form of laws and regulations impacting the pharmaceutical industry in the MEA was highlighted as a crucial factor. In addition to the commonly expressed significance of human resources to innovation (Pavitt, 2005; Hitt et al., 2010; Schilling, 2017), this research has illustrated detailed aspects that are necessary to ensure that this factor is organised in a manner to capture

its value and contribution to innovation. Moreover, this research has revealed that the regional aspects in the MEA emphasise the necessity of governments to be involved in innovation initiatives to render them achievable and resource-sufficient. Another outcome of this research that extends what we were exposed to in the literature is the way the innovation process is perceived in the MEA and the driving forces behind it. The fact that pharmaceutical managers give more weight to the market and the commercial pull in driving innovation changes our perception of how innovation is triggered in the MEA.

On the practical side, this research is aimed to present measures and conditions that would facilitate the networking process within the MEA region. This is particularly achieved by addressing contextual and cultural issues related to networking and how they can be handled in a way to ensure successful collaborative networking ventures among SMEs in the pharmaceutical sector. This has expanded the literature-based perception that was configured at the beginning of this research concerning the impact of formal networks on innovation by highlighting the importance of informal networks and social capital to innovation in the MEA. The research explained how informal networks are established and the level of confidence they grant to their actors, based on which critical decisions are made. Hence, this research contributes to the wider debate on networking and innovation by emphasising the significance of regional differences and their impact on the relation between network actors as crucial factors that need to be considered in establishing innovation networks. It also stands as a reference for SMEs that embark on collaborative innovation projects to review practical case studies in similar situations where the lessons learned from networking experiences were explained. In addition, this research is intended to serve as a reference for ambitious governments in the MEA that work on establishing future visions and strategic roadmaps for their countries and that have an interest in improving the contribution of the pharmaceutical industries to their economies through innovation.

CHAPTER 6 – CONCLUSION

6.1 Answers to Research Questions

Evidence from the fieldwork conducted in five SMEs in the pharmaceutical sector in three different countries in the MEA and from 30 interviews with pharmaceutical managers from various levels in these organisations have established conclusions that change our perception of how pharmaceutical innovation is approached in the MEA. While addressing this research first question pertaining to challenges affecting the capabilities of innovative SMEs in the pharmaceutical sector in the MEA, gathered evidence reveals that SMEs take major changes to mitigate the ownership, structural, and organisational challenges they face on their path to develop innovative capabilities and gain competitive commercial advantages. These changes might entail mergers, acquisitions, or selling off parts of organisations for the inclusion of strategic partners and securing financial and technical support. Other challenges that face SMEs include innovation laws and regulations that limit creativity and affect the commercial feasibility and viability of innovation projects. These require the direct involvement of relevant governmental authorities to ensure providing a legal infrastructure that supports innovation. As one main driver of innovation, a positive company culture can support innovation in SMEs in the MEA, and it can be established by adopting an open-door policy, removing gaps between upper management and lower levels of employees, and creating a culture to encourage creativity. The relatively small pharmaceutical markets in the MEA stand as another challenge for innovation and an obstacle to benefitting from the economy of scale advantages. SMEs tend to resolve this barrier by accessing new bigger markets whether directly or through strategic partnerships.

As an answer to this research second question of how innovation can be identified, incubated, and developed from conception till successful commercialisation, this research has shown that innovation is believed not to be directly linked to dynamics of growth in any country but is significantly impacted by the availability of resources and capabilities that are required for innovation projects. The main drivers and triggers of innovation in the pharmaceutical industry in the MEA are actual market needs and commercial viability and the existence of a systematic innovation process is not

perceived as a crucial requirement for innovation in comparison to having actual market demand.

The critical factors of innovation in the pharmaceutical industry in the MEA are the human factor, financial resources, and ambitious governments to initiate and foster innovation initiatives. The human factor serves innovation in terms of multidisciplinary teams of qualified, competent, motivated, and passionate individuals with identified responsibilities and authorities. Although considered as an abundant resource in many MEA countries, financial capabilities need to be adequately managed in terms of allocation and setting the right investment policies to serve innovation projects. These factors are believed to be complemented by the direct and comprehensive involvement of ambitious governments that can provide support systems and necessary resources for innovation.

The third research question on how organisations entering a networking venture benefit from networking and develop their innovative capabilities was answered by revealing that collaborative networks comprising research institutes, universities, industrial organisations, funding agencies, and regulatory bodies are perceived as a necessity for innovation in the pharmaceutical industry in the MEA. Such networks are believed to be a possible solution to mitigate innovation challenges confronting SMEs in the pharmaceutical sector in the MEA and can be an effective tool to provide the required factors and resources for innovative pharmaceutical organisations. These networks need to be supervised by relevant governmental authorities that can facilitate networking issues and influence the provision of resources that are needed for innovation projects.

It is believed that one of the main advantages of joining a network that has actors from developed countries is the facilitation of regulatory issues related to innovative products. While being in a network with partners from developed countries, organisations are willing to absorb superiority pressure and accept compromises for the benefit of added experience and exposure to proven know-how. SMEs in the pharmaceutical sector give more weight to the benefits they expect to gain from superior partners than the loss of interests or identities. Any issues related to differences between network actors can be resolved through contractual agreements

which are an effective tool to secure the rights and interests of members of collaborative networks and avoid any conflicts. In addition, as a preventive action to avoid any interruptions to a collaborative network, checking and evaluating the prior history of potential actors, particularly in terms of competence, track record, and history of honouring contractual obligations are sensible precautions. However, for an innovation network to succeed in the MEA, actors from local organisations expect to be treated as peers by their counterparts from developed countries. The perception of being underestimated or taken advantage of would construct an obstacle and a reason to end collaboration due to cultural factors. Among the different measures of fit between partners of a collaborative network, the strategic fit is perceived as a crucial element to determine the success of any innovation project. This reflects the importance of strategic alignment between collaborating partners in terms of vision, motives, goals, and innovation strategies.

As one form of networking, OI faces the challenges of the fear of sharing knowledge, the culture of assuming bad intentions, and mistrusting others which are prevailing in some countries in the MEA. To overcome these obstacles and gradually establish solid bases for innovation in pharmaceutical SMEs in the MEA, IP laws and regulations, contractual agreements, knowledgeable employees, partners with a proven track record, and sharing previous success stories are identified as critical success factors for OI.

This research has revealed a unique and effective form of networking in the MEA which is informal networks that are based on the social capital of pharmaceutical managers and business owners. Such networks are based on personal relations, trust, and respect and are common among key industrialists and pharmaceutical experts. These networks have their own set of characteristics that give them a high value in the pharmaceutical industry, and they are usually utilised for making crucial business decisions.

This research has introduced the concept of collaborative innovation networks that are based on two levels of networking; one has a direct impact on innovation and the other has a supporting role and an indirect effect on innovation. These two levels comprise a blend of formal and informal networks that work jointly and coherently to provide critical innovation factors and achieve innovation objectives. Table 13 maps and

summarises the findings and propositions this research offers against the tentative connections between the research variables that were identified in the literature review chapter.

Table 13: Tentative Connections between Research Variables versus Findings and Propositions

Research variables	Tentative connection between variables	Research findings and propositions
Theme 1: Innovation challenges		
Macro-economic indicators, resources, and capabilities	Innovation is linked to dynamics of growth and macro-economic factors. Innovation requires resources, infrastructural elements, and capabilities.	Macro-economic factors are not the main drivers or triggers of innovation in the MEA but they have a role that assists in creating an environment that supports innovation.
Innovation challenges	Challenges facing pharmaceutical innovation in developing countries include political instability, less economic freedom, the avoidance of investing in fields of high risk and dominant use of scientific knowledge, and the scarcity of innovation systems originated in developed countries.	Challenges facing pharmaceutical innovation in developing countries include innovations laws and regulations, social barriers, and economy of scale.
The cultural aspect	The cultural aspects related to the tendency to associate the origins of innovation with certain organisations, societies, or countries can affect promising innovations that originate in SMEs in the MEA.	A positive company culture can support innovation in SMEs in the MEA, and it can be established by removing the gap between upper management and lower levels of employees, encouraging creativity, and being more tolerant towards mistakes
Innovative capabilities and essential skills	Fully integrated innovators are declining, and innovative organisations seek missing or additional resources and capabilities from external sources. Such efforts are usually faced with several obstacles that hinder the adequate acquisition and provision of such crucial elements to innovation.	Innovation in the MEA can be established based on cooperation protocols between research institutes, universities, industrial organisations, funding agencies, and regulatory bodies and supervised by relevant governmental entities.
Theme 2: Innovation process and factors		
Innovation process	Innovation is triggered by conception and follows a systematic approach.	The innovation process in SMEs in the pharmaceutical sector in the MEA is triggered and driven by market needs and commercial viability.
Critical factors of the innovation process	Resources, infrastructural elements, know-how, and capabilities.	The human factor, financial resources and capabilities, and governmental support.
The effect of critical innovation factors on the innovation process	Factors affect the ability of an organisation to innovate, and they change in terms of importance and necessity along the innovation process.	Innovation is driven by qualified and competent people with the passion to innovate and the will to succeed and by financial resources directed towards innovation by governments.
The relative importance of innovation factors	Factors are different in terms of importance and impact.	Innovative SMEs in the MEA depend heavily on the human factor in the form of collaborating multidisciplinary teams and then by the availability of financial resources and supporting governments.

Research variables	Tentative connection between variables	Research findings and propositions
Theme 3: Innovation and networking		
Effect of innovation factors on a collaborative innovation network	Collaborative networking provides external factors and resources that are essential to innovation but not readily available for innovative organisations.	The impact of innovation factors, resources, and capabilities will be increased in case of networking and will drive innovation positively.
Impact of networking in settings that involve actors from developed and developing countries on innovation	Building a sustainable biotechnology industry in developing countries requires developed countries and international organisations to establish collaborative alliances with organisations in developing countries to promote innovation.	For innovation networks to be beneficial and effective, they are better to include actors from developed countries who have experienced successful innovation projects.
Ability to join and benefit from an innovation network	The ability of an organisation entering a collaborative arrangement to access social capital, technical know-how, funding sources, and scientific knowledge is based on its absorptive capacity, networking readiness, and trust-building capabilities.	SMEs in the pharmaceutical sector in the MEA select their networking partners based on a proven track record of innovation experience, and their history of dealing with such partners.
Effect of networking on innovative capabilities	Providing external factors and resources that are essential to innovation but not readily available for innovative organisations.	Networking with external entities is a way to develop innovative capabilities to the level that experienced partners have reached.
Language fit, cultural fit, and strategic fit	Alliance relationships are impacted by language fit, cultural fit, and strategic fit.	The strategic fit between partners from different countries can overcome the differences in culture and language, giving priority to ensuring the alignment of this measure over other factors.
Sources of conflicts in a collaborative network	Seeking resources and capabilities from external sources usually faces several obstacles that hinder the adequate acquisition and provision of such crucial elements to innovation.	Seeking control and more benefits over partners, lack of trust, differences in objectives and work pace, and unidentified responsibilities.
Effect of regional aspects on innovation collaboration models	The success of collaborative alliances is impacted by regional aspects.	The regional aspects in the MEA emphasise the necessity of governments to be involved in innovation initiatives to render them achievable and resource-sufficient.
Effect of various levels of knowledge and economic superiority between partners on identity and interests.	Partner quality, knowledge heterogeneity, and relational strength have a positive effect on the innovation performance of an organisation and a significant impact on the innovation outcome.	SMEs in the pharmaceutical sector in the MEA give more weight to the benefits they expect to gain from superior partners than the loss of interests or identity. They manage this concern through sound contractual agreements
Open Innovation (OI)/open science	Open Science provides for sharing and developing knowledge and making it accessible. Open Science initiatives have resulted in the globalisation of skills that are required in biotechnology.	Critical success factors that underpin OI in the context of SMEs in the pharmaceutical sector in the MEA comprise IP laws and regulations, contractual agreements, knowledgeable employees, partners with a proven track record, and sharing previous success stories

6.2 The Impact

This research is anticipated to have the following impact as per the illustrated dimension:

6.2.1 The Organisational Dimension

Individual organisations that are characterised by strategic innovative capabilities; covering the identification of opportunities, mobilising resources to seize opportunities, and continuous renewal (Teece, 2012) can be the main beneficiaries of the model presented in this research to develop their capabilities. Moreover, organisations that were involved in this research can explore and evaluate means for networking and collaboration and can have the opportunity to consider the suggested networking model to support their innovative capabilities, identify and mitigate challenges, and advance their innovation projects. In addition, these participating organisations had the opportunity to be acquainted with the recent concepts and definitions related to innovation, the innovation process, and networking and can promote such concepts within their business contacts.

6.2.2 The Pharmaceutical Industry Dimension

The successful implementation of the suggested networking model presented in section 5.2 of this research is expected to contribute to creating an innovation culture where different stakeholders collaborate and integrate to facilitate and support the innovation process. The pharmaceutical industries in the MEA that succeed in implementing the networking model are expected to prosper, advance more rapidly, and achieve long-term economic growth (Fagerberg, 2003). On the one hand, such a model may form the grounds to create common services to serve individual organisations' needs pertaining to their innovation ventures. On the other hand, continuous successes in terms of innovation will create a reputable image for the industry on the national and international levels as an advanced and scientifically sound industry that will attract governmental support and be the focus of educational institutes' research initiatives.

SMEs in the pharmaceutical sector in the MEA will be in a better position to recognise their competitive advantages and assume significant roles in regional and international collaborative networks that can complement and develop their innovative capabilities.

Major pharmaceutical organisations from developed countries are expected to be more encouraged to establish partnerships in the MEA and be more willing to transfer know-how and technology when they observe a growing culture of innovation, hence improving the pharmaceutical industries in the MEA region.

6.2.3 The Personal Dimension

The researcher has developed specialised knowledge and experience in designing, implementing, facilitating, and monitoring collaborative innovation networks involving multiple international organisations. While conducting the research, solid contacts were established within the industry and with key players, which will support the researcher's future endeavour to add value to prospective collaboration ventures. The researcher plans to share the knowledge and experience gained with concerned organisations and stakeholders in developing countries through relevant international organisations. Moreover, the researcher aspires to be a promoter of realising and developing innovative capabilities of SMEs in the pharmaceutical sector in the MEA and utilise his growing knowledge in supporting these organisations towards achieving their ambitious innovation goals.

In November 2021 and March 2022, the researcher was selected by the government of Jordan to participate in a committee to establish a vision and a roadmap for developing the industrial sector in Jordan and in another committee to develop the pharmaceutical sector. In both streams, the researcher presented initiatives that were aimed at encouraging networking between industrial organisations in Jordan and other entities in the MEA to develop innovative capabilities. One of the initiatives that the researcher presented entailed exporting technical know-how through networking between Jordanian pharmaceutical companies and investment companies in the strategic export markets in the MEA as a counter measure to mitigate the increasing risk of losing market shares in those markets to locally developed products. Another initiative was the establishment of local entrepreneurial ecosystems that involve private pharmaceutical companies, educational institutes, and relevant governmental entities to improve vocational training. The systems entailed providing basic education for unemployed individuals and then subjecting them to practical training in pharmaceutical companies

under the supervision of the ministries of education and labour. They also included granting tax exemptions for participating companies in return for their efforts in providing training for the beneficiaries, and accordingly minimising the need for any external support. Moreover, the researcher participated in an initiative to facilitate the procedures and shorten the registration process of generic pharmaceutical products at the Jordanian Food and Drug Association (JFDA) to reflect the input received from many participants in this research regarding regulations.

The initiatives were eventually submitted to the Royal Hashemite Court of Jordan to be coordinated with the government's efforts to support economic sectors and create job opportunities. This participation provided the researcher with an opportunity to practice the knowledge gained in this research in a real-life situation and to assist in resolving some of the issues the Jordanian economy suffers from. In addition, it gave the researcher the chance to be in direct communication with the highest authorities in Jordan, including His Majesty the King of Jordan, and observe their expectations and commitment to bringing submitted initiatives to reality. These activities and initiatives were covered by the media in Jordan and received wide community recognition. These participations have left a positive impression on some of the researcher's contacts who were optimistic about the selection of the researcher in these committees. They informed the researcher that his involvement in such efforts will create a valuable opportunity for him to utilise his newly gained knowledge for the benefit of the pharmaceutical industry in particular and the local economy in general.

These contributions have culminated in the participation of the researcher in the launch of the new Economic Modernisation Vision for Jordan that was organised on the 6th of June 2022 with the presence of His Majesty the King of Jordan. The researcher expects to stay involved in the implementation of the vision under the supervision of the Royal Hashemite Court of Jordan during the period from 2022 until 2033.

6.2.4 The Community Dimension

With more commercially viable innovations, various businesses are expected to be launched and developed and hence multiple job opportunities are expected to be created. This will help in reducing unemployment rates in different developing countries

and achieving economic growth. On another aspect, the researcher observed during this research the enthusiasm and positivity some participants expressed about the research topic. They indicated their optimism that it can be a step on the way to establishing innovation efforts in the pharmaceutical organisations in the MEA. In addition, most of the participants showed signs of contentment for being chosen to participate in the research and felt recognised and appreciated for their experience, views, and perceptions concerning such a vital subject to their industry. Some also indicated that they were intrigued by the research questions and were left with on-going thoughts about the benefits that pharmaceutical companies in the MEA can achieve if the research goals are realised. Moreover, scientists and innovators who play a role in the networking model presented in this research can achieve recognition, acknowledgment, and rewards as the inventors who triggered commercially viable innovations. This is expected to encourage such individuals, their peers, and their followers to walk on the same path and believe in their internal capabilities and the importance of their innovative ideas, which will establish the grounds for more innovations and creativity.

6.2.5 The Country Leadership Dimension

On 15 August 2022 the researcher was humbled and honoured to receive an appreciation note and an appreciation letter from His Majesty King Abdullah II of Jordan in recognition of his participation in the country's efforts to formulate Jordan's Economic Modernisation Vision.

6.3 Contribution

The contribution of this research has three folds; contribution to literature, to practitioners, and to policy-makers. These different types of contributions are illustrated in the following sections.

6.3.1 Contribution to Literature

The findings of this research offer alternative theorisations on networking and innovation by exploring the MEA context which is under-represented in the extant literature. Contrary to the literature that suggests that there is a link between innovation and the dynamics of growth and prevailing macro-economic factors (Tsvetkova et al., 2017; Sharma, 2018), this research shows that factors of market needs, knowledge, and

competition in the MEA region can play a crucial role in encouraging innovation. This finding creates an opportunity for developing countries with unfavourable macro-economic conditions to seek economic growth through innovation. In addition, this research contributes to extending the role of human resources in leading and managing innovation projects from explaining goals, handling conflicts, and encouraging commitment (Conway, 2015) to include the management of acquiring and sharing knowledge by innovation team members.

Moreover, this research has identified an additional perception of the innovation process that exists in the pharmaceutical industry in the MEA, where the attention is more towards market needs and commercial viability as triggers of innovation rather than conception or the science push (Tohidi and Jabbari, 2012). These findings confirm the effect of economic factors on innovation and suggest that SMEs in the pharmaceutical sector mitigate the risks encountered with innovation by assurances related to market needs and commercial viability.

This research contributes to the wider debate on innovation by extending the literature on networking (see Rothwell, 1994; Chesbrough, 2003; Leenders and Dolfsma, 2016; Ramadani, 2019; Temel and Vanhaverbeke, 2020) by highlighting additional reasons why pharmaceutical managers in the MEA consider networking while embarking on innovation projects. These reasons include accessing specialised knowledge, having more impact and influence on governmental entities, funding agencies, and regulatory authorities, and attracting experienced partners. This research suggests that for such reasons, SMEs in the pharmaceutical sector in the MEA take short-term actions that offer flexibility and tolerance regarding their internal policies and interests for the long-term benefits of building their innovative capabilities. In addition, this research has identified a unique form of networking that is commonly used within the pharmaceutical industry communities in the MEA and that is effective and reliable. This form consists of informal networks that are based on the social capital of pharmaceutical organisations' stakeholders and that are usually consulted for critical and strategic decisions impacting the pharmaceutical industry. This research reveals that the shape and activities of informal networks in the MEA have an impact on competition norms and the individual

contribution by SMEs in the pharmaceutical sector to their industry on national levels and to their local economies in general.

Moreover, this research adds another dimension to our understanding of innovation and networking by introducing a model that comprises two levels of linked and dependent networks. The two levels of networking in this model include actors from different sectors that are directly or indirectly involved in innovation projects and incorporate critical factors of the innovation process. The model aligns the actors and factors in a manner that ensures smooth collaboration efforts on each level and triggers the reciprocal and coherent movement of the two levels. This extended form of networking is aligned with the contextual setting of the MEA region and addresses its unique cultural, social, regional, and economic aspects. In addition, this model contributes to the literature on innovation networks (Imai and Baba, 1989; Camagni, 1991; Jones et al., 2001; Granovetter, 2018) by blending formal and informal networks and synchronising their contributions in a single coherent framework to drive innovation. With the successful operation of such a model, regional and cultural aspects prove to be sources of establishing new networking norms that can work and serve innovation initiatives on a larger geographical scale. It is anticipated that innovation stakeholders in the MEA comprising private and public entities will consider this model as a workable tool to bridge gaps in innovative capabilities and realise innovation potential.

6.3.2 Contribution to Practitioners

This research contributes to supporting SMEs in the pharmaceutical sector in the MEA countries in coping with market dynamics by strengthening their competitive advantages through the differentiation of innovative products. With the prevailing market characteristics in many MEA countries, differentiation of pharmaceutical products through innovation becomes an imperative strategy to face the increasing number of competitive generic products. The innovation model presented in this research can be used as a tool to establish such a strategy and translate innovation goals and objectives into workable action plans.

This research contributes to the concept of OI (Chesbrough, 2003) by highlighting a potential route for its implementation in the pharmaceutical sector in the MEA. This

route relies on the difference in mentality and openness between older and newer business generations in the MEA region and the change from conservatism to openness in traditional norms of conducting business. The research indicates reasons that encourage the implementation of this concept for the foreseen advantages, especially in terms of minimising cost and risk. Thus, OI can be a strategy for SMEs that are taking precautionary measures to mitigate anticipated innovation risk and cover the required financial resources. Accordingly, this research suggests that OI offers the opportunity for SMEs in the pharmaceutical sector in the MEA to approach innovation in a manner that addresses their concerns and secures critical innovation factors. This implies that what initially looked like a concept that is hardly acceptable to SMEs in the pharmaceutical sector in the MEA can be the solution for them to realise and develop their innovative capabilities.

6.3.3 Contribution to Policy-makers

This research assists in changing the typical perception of governments and governmental entities from being rigid controllers and regulators (Majone, 2019) to becoming influencers and active actors in collaborative networks driving innovation in the pharmaceutical industry as one vital economic sector in the MEA countries. The suggested collaboration model in this research can be utilised in public-private partnership projects and programs (Lee et al., 2012) as a reference for establishing collaboration and networking frameworks and identifying the proper and effective connections between actors from different relevant sectors. Bridging the gap between public and private sectors with the help of the suggested innovation model is expected to reflect positively on building effective communication channels and coordinating the capabilities and resources of all participating parties to the benefit of economies. The fact that this model was developed based on field research and contribution from different pharmaceutical entities in more than one country renders it a practical tool that can be generalised widely throughout the MEA.

6.4 Limitation of the Research

Although the selection of this research methodology that comprised mainly qualitative research was deemed appropriate for the research topic, it is envisaged that further research involving quantitative techniques would add additional insights that would

enrich the findings and the proposed innovation model. In addition, the findings of this research were focused around SMEs in the MEA and it is expected that more innovation challenges and means to developing innovative capabilities can be obtained from the experience and practices of larger pharmaceutical organisations.

Another limitation of this research relates to the sample size. Critics of case-oriented research that utilises interviews to generate data often cite the size of the sample as the main issue (Vasileiou et al., 2018). However, the main aim of this research was not to generalise its results to a large population as in quantitative research but instead the goal was to achieve what Yin (1994) described as analytical generalisation. In a way, the study was designed to achieve generalisation from data to theory (Yin, 2009). A key challenge for this would be to then test the suggested innovation model in similar settings to evaluate its validity (Gerring, 2004).

6.5 Opportunities for Future Research

Although it was not the main aim of this research and it was not designed to focus on, an interesting element emerged, which is the impact of the innovation culture on the establishment and evolution of innovation in the MEA. Pharmaceutical managers who were interviewed in the MEA countries indicated that infusing an innovation culture among people, especially at a young age, is crucial to forming the essential cornerstone of innovation. Some went even further by suggesting how an innovation culture can be created by referring to basic education, motivation, encouragement by direct managers, and appreciation based on innovative achievements. It would be interesting to take this aspect further by investigating how an innovation culture can be created in organisational entities in the MEA and the impact it will have among other elements on innovation. Another suggested area for further research is to test the research findings, especially in terms of critical factors of innovation and networking success factors, in larger pharmaceutical organisations in the MEA and observe any unique differences or additions. Such outcomes can be utilised to enhance the suggested networking model in this research and render it applicable in a wider scope of organisations. Another area for possible further research is to test the offered innovation model in regions other than the MEA and investigate the impact of regional settings on its effectiveness. It will be

interesting to observe the effect of contrast in issues related to culture, trust building, and willingness to collaborate openly with others on the model and its operation. While the proposed innovation model in this research is intended to serve the pharmaceutical industry, it is anticipated that it can apply to other industries too. However, some adjustments might be needed in terms of the involved entities and the crucial factors, creating an opportunity for further research and investigation.

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Appendix 1: Coding Structure

Theme	Codes
Innovation Challenges	Organisational and Structural Limitations
	Innovation Laws and Regulations
	Organisational Culture and Innovation
	Innovation and Economic Factors
Innovation Process and Factors	Innovation Drivers
	Human Factor
	Financial Resources
	Governmental Support
Innovation and Networking	Importance of Networking to Innovation
	Composition of Innovation Networks
	Impact of Social Capital on Innovation
	Informal Networks in the MEA
	Open Innovation

Research Information Sheet

Title of the research project: The impact of networking on innovation and commercialisation in pharmaceutical organisations in the Middle East and Africa (MEA).

This research focuses on the gap between innovation and commercialisation and introduces solutions to bridge it and accordingly facilitate the innovation process. Moreover, the research focuses on how the innovation cycle can be nurtured and incubated within and beyond pharmaceutical small and medium-sized enterprises (SMEs) in the MEA region to transform innovations from a conceptual idea into an applied innovation and a realised commercially viable project.

The research forms part of my DBA academic qualification at Nottingham Business School at Nottingham Trent University.

The research methodology includes interviewing people who are involved with any phase of the innovation process at an SME in the pharmaceutical sector in the MEA region. Hence, you are invited to contribute by taking part in this research and allocating one (1) hour and thirty (30) minutes of your time for an interview with the researcher.

During the interview, the researcher will ask you questions about:

- The main challenges affecting the innovation capabilities of innovative SMEs in the pharmaceutical industry in the MEA
- Developing innovative ideas from conception till successful commercialisation
- Factors that influence innovation in SMEs in the pharmaceutical industry within the MEA
- Effect of networking on developing innovative capabilities

The participant may elect not to answer any of the research questions or withdraw from the research as per his/her convenience. In case the participant wishes to withdraw from the research after the conclusion of the interview(s), he or she may do so by 31 March 2022. This can be performed by contacting the researcher at the address shown below and requesting the removal of part, or all, of the information provided by the participant. A confirmation will be sent back from the researcher to acknowledge receiving and fulfilling the request. A justification will not be required from the participant. In addition, the researcher will not attempt to push the participant to change his/her mind.

For ease and accuracy of documentation, and subject to the participant's permission, the researcher would like to record the interview and take notes for further analysis. The data and information obtained will be retained securely with the researcher for future reference and for inclusion in future research or related publications subject to the consent of participants.

The participants in this research and their corresponding organisations will remain anonymous during all stages of the research and their identities, or any signs that might indicate their identities, will not be included in the final report.

The research has been subject to ethical review in accordance with the guidelines specified by Nottingham Trent University Research Ethics Committee and has been approved for conduct.

If you have any further questions about the research, please don't hesitate to contact the researcher or his direct supervisor at the following addresses:

Contact details of the Researcher:

Name: Amer Al-Khatib	Email: n0819779@my.ntu.ac.uk	Phone: +44 (0)115 848 2203
Address: 50 Shakespeare Street, Nottingham, NG1 4FQ, UK.	Institution: Nottingham Business School, Nottingham Trent University.	

Contact details of the Direct Supervisor:

Name: Dr. Amon Simba	Email: amon.simba@ntu.ac.uk	Phone: +44 (0)115 848 2203
Address: 50 Shakespeare Street, Nottingham, NG1 4FQ, UK.	Institution: Nottingham Business School, Nottingham Trent University.	

Consent Form

Title of the research project: The impact of networking on innovation and commercialisation in pharmaceutical organisations in the Middle East and Africa.

The researcher: Amer Al-Khatib; a DBA candidate at Nottingham Business School at Nottingham Trent University.

1. I have read the information sheet relating to the research and it had been explained to me by Amer Al-Khatib and all my questions have been answered to my satisfaction.
2. I agree to the arrangements described in the information sheet related to my participation.
3. I understand that my participation is completely voluntary and that I may elect to withdraw from the research at any time.
4. I agree to the interview being recorded by any means selected by the researcher.
5. I agree to the primary data being used in publications directly related to this research. I understand that data will be retained securely for this purpose.
6. I have received a copy of this consent form and of the information sheet related to the research.
7. I am aged 18 or older.

Name:	Signature:	Date:
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Contact details of the Researcher:

Name: Amer Al-Khatib	Email: n0819779@my.ntu.ac.uk	Phone: +44 (0)115 848 2203
Address: 50 Shakespeare Street, Nottingham, NG1 4FQ, UK.	Institution: Nottingham Business School, Nottingham Trent University.	

Contact details of the Direct Supervisor:

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Address: 50 Shakespeare Street, Nottingham, NG1 4FQ, UK.	Institution: Nottingham Business School, Nottingham Trent University.	

Appendix 4: Data Collection Sheet

Data Collection Sheet**Participant information**

Name		Organisation		Department	
Title		Country		City	
Degree		Total exp.		In current job	
Email		Contact #		CF signed	

Interview information

Location		Recorded?		Recording ref.	
Start time		End time		Date	

Organisation information

Characteristics of the organisation	Criteria	Results
Size in terms of manpower	Less than 250	
Size in terms of sales value	Less than 50 M Euros	
Number of years since establishment	More than 10 years	
Markets coverage	Local, regional and international	
Research and development function	Exists internally and is mature	
Patents	Availability of registered or filed patents	

Additional information

Main fields of business	
Main therapeutic areas	
Number of products	
Ownership structure	
Web site	

Research Topic

The impact of networking on innovation and commercialisation in pharmaceutical organisations in the Middle East and Africa (MEA)

Part 1	Innovation enablers in the pharmaceutical industry in the MEA
Research question	What are the main challenges affecting the capabilities of innovative small and medium-sized enterprises (SMEs) in the pharmaceutical industry in the MEA?
Investigative questions <ul style="list-style-type: none">• What is the effect of dynamics of growth, macro-economic factors, resources and capabilities on innovation?• What are the issues hindering innovation in the pharmaceutical industry in the MEA?• What is the effect of the cultural aspect on promising innovations that originate in SMEs in the MEA?• How can SMEs in the pharmaceutical sector in the MEA recognise and utilise their innovative capabilities?• How can SMEs in the pharmaceutical sector in the MEA complete and develop their innovative capabilities?	

Part 3	Innovation and networking
Research question	How can an organisation entering a networking venture benefit from networking and develop its innovative capabilities?
<p>Investigative questions</p> <ul style="list-style-type: none"> • Is the effect of innovation factors different if innovation is done by one organisation compared to a network? • What is the impact of networking in settings that involve actors from developed and developing countries on innovation? • How can an organisation assess and predict its ability to join and benefit from an innovation network? • How can networking develop innovative capabilities effectively in the MEA countries? • What are the possible sources of conflicts in a collaborative network involving SMEs in the MEA and how can they be avoided? • What is the impact of language fit, cultural fit and strategic fit on collaborative networks? • What is the effect of regional aspects on innovation collaboration models? • How can partners of a collaborative network of various levels of knowledge and economic superiority maintain their interests, control measures and identity and avoid any compromises? • Can open innovation and open science be applicable in SMEs in the MEA and how can they benefit from them? 	

