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**THE EFFECT OF TECHNOLOGICAL INNOVATION AND
KNOWLEDGE MANAGEMENT PROCESS ON
ORGANISATIONAL AGILITY IN PUBLIC HIGHER
EDUCATION IN UAE: THE MEDIATING ROLE OF
SUSTAINABLE PERFORMANCE**

SALEH MOHAMMED YOUSEF OBAID ALKAABI



**DOCTOR OF PHILOSOPHY
UNIVERSITI UTARA MALAYSIA
2025**

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**A thesis submitted to the Ghazali Shafie Graduate School of Government in
fulfilment of the requirements for the Doctor of Philosophy
Universiti Utara Malaysia**



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ABSTRACT

Organisational agility is one of the critical issues for organisational survival in recent years. Key contributors to this agility include technological innovation, knowledge management process and sustainable performance. However, limited studies have examined these relationships in the context of developing countries. This study investigates the impact of technological innovation, knowledge management processes, and sustainable performance (SP) on organisational agility (OA) within universities in the United Arab Emirates (UAE). Employing the Resource-Based View (RBV) and Knowledge-Based View (KBV) as theoretical frameworks, this research explores how technological, and knowledge assets can be leveraged to enhance sustainability and agility in higher education institutions. Data were collected through questionnaires from managerial staff and lecturers using stratified random sampling. A total of 319 responses were collected and analysed using Smart PLS 4. Additionally, expert interviews with representatives from three public universities in the UAE provided qualitative insights to complement the quantitative findings. The findings showed that both technological innovation and knowledge management processes significantly influence sustainable performance and organisational agility. Moreover, sustainable performance positively affects organisational agility and partially mediates the relationship between technological innovation, knowledge management processes, and organisational agility. The expert interviews corroborated the quantitative findings, offering real-world insights and practical examples. These results highlight that universities prioritizing sustainability not only advance environmental and social objectives but also enhance their adaptability in an evolving educational landscape. The study emphasizes the need for higher education institutions to strengthen their technological innovation and knowledge management strategies to achieve both sustainable performance and organisational agility.

Keywords: Organisational Agility, Technological Innovation, Knowledge Management, Sustainable Performance, Higher Education.

ABSTRAK

Ketangkasan organisasi merupakan salah satu isu kritikal untuk kelangsungan organisasi dalam beberapa tahun kebelakangan ini. Penyumbang utama kepada ketangkasan ini termasuk inovasi teknologi, proses pengurusan pengetahuan, dan prestasi lestari. Walau bagaimanapun, kajian yang meneliti hubungan ini dalam konteks negara membangun masih terhad. Kajian ini menyelidik impak inovasi teknologi, proses pengurusan pengetahuan, dan prestasi lestari (SP) terhadap ketangkasan organisasi (OA) dalam kalangan universiti di Emiriah Arab Bersatu (UAE). Dengan menggunakan Pandangan Berasaskan Sumber (RBV) dan Pandangan Berasaskan Pengetahuan (KBV) sebagai kerangka teori, penyelidikan ini meneroka bagaimana aset teknologi dan pengetahuan dapat dimanfaatkan untuk meningkatkan kelestarian dan ketangkasan dalam institusi pendidikan tinggi. Data telah dikumpulkan melalui soal selidik daripada kakitangan pengurusan dan pensyarah menggunakan pensampelan rawak berstrata. Sebanyak 319 respons telah dikumpulkan dan dianalisis menggunakan Smart PLS 4. Selain itu, temu bual dengan pakar dari tiga universiti awam di UAE memberikan pandangan kualitatif bagi melengkapkan dapatan kuantitatif. Dapatan kajian menunjukkan bahawa kedua-dua inovasi teknologi dan proses pengurusan pengetahuan mempunyai pengaruh yang signifikan terhadap prestasi lestari dan ketangkasan organisasi. Selain itu, prestasi lestari memberi kesan positif terhadap ketangkasan organisasi dan berperanan sebagai perantara sebahagian dalam hubungan antara inovasi teknologi, proses pengurusan pengetahuan, dan ketangkasan organisasi. Temu bual pakar mengesahkan dapatan kuantitatif dengan memberikan pandangan dan contoh praktikal dari dunia sebenar. Hasil kajian ini menekankan bahawa universiti yang memberi keutamaan kepada kelestarian bukan sahaja mencapai matlamat alam sekitar dan sosial tetapi juga meningkatkan daya tindak dan keupayaan menyesuaikan diri dalam landskap pendidikan yang dinamik. Kajian ini menegaskan keperluan institusi pendidikan tinggi untuk memperkukuh strategi inovasi teknologi dan pengurusan pengetahuan bagi mencapai prestasi lestari dan ketangkasan organisasi.

Kata Kunci: Ketangkasan Organisasi, Inovasi Teknologi, Pengurusan Pengetahuan, Prestasi Lestari, Institusi Pendidikan Tinggi.

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LIST OF ABBREVIATION

AI	Artificial intelligence
AVE	Average Variance Extracted
B	Beta Coefficient
CA	Cronbach's Alpha
CR	Composite Reliability
HCT	Higher Colleges of Technology
HE	Higher education
HEI	Higher Education Institutions
IoT	Internet of Things
IT	Information Technology
KAQ	Knowledge Acquisition
KBV	Knowledge Based View
KC	Knowledge Creation
KCO	Knowledge Conversion
KM	Knowledge Management
KMP	Knowledge management process
KS	Knowledge Sharing
OA	Organizational Agility
P	P-value
PLS	Partial Least Square
RBV	Resource Based View
RFID	Radio Frequency Identification
SDGs	Sustainable Development Goals
SMEs	Small and Medium Enterprise
SP	Sustainable Performance
T	T-value
TI	Technological Innovation
UAE	United Arab Emirates
UAEU	UAE University
UN	United Nations
VIF	Variance Inflation Factor
ZU	Zayed University

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Information technology (IT) has become a crucial component in various sectors, including business, education, healthcare, government, retail, and manufacturing. It has brought about significant changes in the operations and service delivery of organisations (Lian & Xu, 2023). In response to the growing importance of digital infrastructure in the global economy, various countries, governments, and organisations are making significant investments in technology development. This is aimed at ensuring competitiveness and adaptability in the face of rapid changes in the modern world (Dabbous et al., 2023). The rapid progress of IT has fundamentally transformed conventional business models, necessitating organisations to swiftly adapt and incorporate technology into their fundamental operations (Syamsuddin et al., 2024).

Technological innovation (TI) is critical for organisations that seek to enhance their competitive advantage and long term growth. Organisations must prioritise the integration of new technologies as a crucial strategic initiative in order to remain competitive in the market (Leong et al., 2023). Organisations are being encouraged to invest in advanced technologies and these technologies include but not limited to artificial intelligence (AI), blockchain, cloud computing, and the Internet of Things (IoT) to improve efficiency and facilitate better decision-making (Kumari, 2023). These innovations have the dual benefit of improving internal operations and promoting

innovation and creativity. This allows organisations to expand their offerings, access global markets, and enhance collaboration across different locations (Komolafe et al., 2024).

Research has consistently demonstrated that technology is crucial in fostering adaptation and sustainability. This enables organisations to effectively adapt to environmental shifts, optimise the allocation of resources, and enhance operational resilience, thereby ensuring their long-term survival (Fernandes et al., 2021). In addition, the utilisation of digital tools allows businesses to attain a global presence by dismantling conventional obstacles to entry and expanding into new markets with greater efficiency (Rosak-Szyrocka et al., 2023). By leveraging automation and digital communication platforms, organisations can improve collaboration both within their teams and with external stakeholders, suppliers, and customers. This, in turn, enhances organisational agility (OA).

Embracing TI offers benefits that go beyond just improving operational efficiency. The advent of digital transformation has provided organisations with unprecedented opportunities to foster innovation, generate value, and bolster their competitive edge (Ramadania et al., 2024). For instance, the utilisation of AI and machine learning empowers data-driven decision-making, enabling companies to forecast market trends, comprehend consumer behaviour, and tailor their offerings. Blockchain technology improves security and transparency in supply chains, while cloud computing offers scalable solutions that lower costs and enhance flexibility (Kumari, 2023). When implemented strategically, these technologies enable organisations to effectively

navigate the challenges of the digital age, enhancing their agility, resilience, and preparedness for the future (Chauhan & Thangavelu, 2024).

Nevertheless, the implementation of technology poses certain obstacles. Organisations must allocate resources to both technology and the development of digital skills within their workforce in order to fully maximise the advantages (Al Naim, 2023). Achieving successful digital transformation necessitates a thorough approach that involves reassessing organisational structures, processes, and cultures to cultivate an environment that promotes continuous learning and innovation (Leso et al., 2023). In addition, the growing dependence on digital infrastructure raises significant concerns regarding cybersecurity, data privacy, and the ethical use of technology (Allahrakha, 2023).

Organisations should prioritise both technological advancements and effective knowledge management (KM) process (KMP). This will prevent redundant efforts and enable them to make well-informed decisions by leveraging their existing knowledge. It is crucial for organisations to adopt this approach when they encounter unforeseen environmental changes that require quick adaptation and innovation (Wielgórka, 2024). The KMP plays a crucial role in enhancing an organisation's competitive advantage by facilitating the structured acquisition, retention, and distribution of knowledge throughout the organisation. Through this approach, organisations can promote ongoing learning, collaborative problem-solving, and innovation, all of which play a crucial role in fostering OA (Marjerison et al., 2022; Rafi et al., 2022).

Insufficient management of knowledge can result in organisations facing redundancy and unnecessary duplication of efforts. This can lead to inefficiencies and hinder progress in crucial areas (Sears & Muhammad, 2024). Without effective knowledge-sharing mechanisms, employees may end up spending unnecessary time on tasks that have already been resolved or addressed elsewhere in the organisation (Asbari, 2024). This can lead to a waste of resources and cause frustration. This issue emphasises the significance of an effective knowledge sharing system, which can aid in the smooth transfer of information and best practices across the organisation (Durugbo et al., 2013; Hussain et al., 2004).

An efficient knowledge-sharing infrastructure can greatly enhance operational efficiency (Song & Yu, 2024). Through the elimination of unnecessary work and the improvement of processes, organisations can maximise the utilisation of their resources (Wang et al., 2023). This allows them to concentrate their efforts on tasks that provide the greatest benefit to the organisation (Yeboah, 2023). In addition, KMP allows organisations to align their resources and strategic initiatives with changing market demands, resulting in a more flexible and responsive organisational structure (Al-Sulami et al., 2023).

Effective KMP are essential for managing and transferring knowledge, especially when employees retire, transition into new roles, or leave the organisation (Mohajan, 2017). This process is crucial for maintaining institutional knowledge through the acquisition, retention, and documentation of vital information, protocols, and methodologies. By implementing this practice, organisations can protect against the loss of knowledge and maintain operational continuity, even when personnel changes occur. Systematically

documenting processes not only ensures consistency but also simplifies the transfer of knowledge to new employees or those transitioning into different roles (Yumhi et al., 2024).

An efficiently organised KMP also promotes collaboration and communication among different teams, departments, and individuals within the organisation. By fostering an environment that values the sharing of knowledge, it motivates employees to exchange valuable insights, ideas, and experiences, resulting in a more cohesive and knowledgeable workforce (Salehi & Sadeq Alanbari, 2023). One way to accomplish this is by offering platforms and resources that facilitate the sharing of knowledge, collaboration across different functions, and collective problem-solving. These platforms encompass knowledge repositories, collaborative tools, and internal networks that facilitate the sharing of expertise and real-time access to pertinent information (Rafi et al., 2022).

Effective KMP improve internal communication and decision-making processes in organisations. By fostering cross-functional collaboration and knowledge sharing, employees can enhance decision-making and expedite responses to new challenges or opportunities. The enhanced responsiveness of the organisation directly contributes to its overall agility, allowing it to swiftly adapt to market changes, technological advancements, and internal shifts in personnel or strategy (Stenbeck & Mix, 2018).

TI and the KMP are well-regarded factors that can indicate OA and SP. Most previous research has primarily examined these factors in relation to business organisations, specifically in the manufacturing industry (Asril et al., 2023; Sarfraz et al., 2022;

Shahzad et al., 2020). Although the insights offered are valuable, it is important to note that the applicability of these findings to other sectors, such as public higher education (HE), is somewhat restricted. In the current literature, there is a lack of agreement on the impact of TI and the KMP on organisational outcomes. The findings are varied and inconclusive (Asril et al., 2023; Keshavarz et al., 2015; Patil et al., 2016).

Several studies have indicated that the impact of the KMP on organisational outcomes may be minimal. This suggests that the mere act of managing and sharing knowledge does not always lead to enhanced agility or performance (Kusuma & Efendi, 2022; Mantow & Nilasari, 2022; Rianto et al. 2021; Syahchari & Sahban, 2019). The findings underscore the complex nature of organisational environments and indicate that additional factors may influence or regulate the connection between the KMP and outcomes such as OA. In contrast, previous studies have found a strong correlation between the KMP and organisational performance and agility. This suggests that effectively managing knowledge can play a crucial role in achieving organisational success (Habibzadeh & Valizadeh, 2021; Salehi et al., 2021; Sari et al., 2022; Suryawan, 2020).

Additionally, the impact of TI on promoting sustainable competitive advantage and OA has yielded varying outcomes. TI was found to have no significant effect on sustainable competitive advantage (Patil et al., 2016). Similarly, the utilisation of IT did not impact OA (Keshavarz et al., 2015). The findings indicate that technology implementation alone may not be enough to foster agility or gain a competitive edge, unless it is strategically integrated with other organisational processes and capabilities. Recent studies have shown that the combination of IT capability and KMP can enhance OA.

This highlights the importance of integrating TI and KMP to improve flexibility and responsiveness in dynamic environments (Panda & Rath, 2018).

Few studies have examined the KMP and TI in the context of developing nations, highlighting a significant gap in the literature. Ode and Ayavoo (2020) emphasise that much of the existing research on these variables has focused primarily on developed economies, where organisations have greater access to advanced technologies and well-established KM frameworks. This underlines the need for more comprehensive investigations into how the KMP and TI operate in developing countries, where resource constraints, institutional weaknesses, and infrastructural challenges may affect their effectiveness. Additionally, research on OA in developing nations is also limited. According to a review of 381 studies, Mrugalska and Ahmed (2021) found that only a small proportion of the literature has explored OA in this context. This lack of research is particularly concerning, given that organisations in developing countries face unique environmental uncertainties and pressures, making OA a critical factor in their survival and growth (Ismail & Supanto, 2024).

Sustainability has emerged as a key issue in today's global environment, driven by increasing concerns about environmental degradation, resource depletion, and social inequality (Mahdy et al., 2023). However, much of the prior literature has approached sustainability from a macro-level perspective, focusing on broad, global initiatives such as the United Nations' Sustainable Development Goals (UN-SDGs) (Arora & Mishra, 2019; Bebbington & Unerman, 2018; Carlsen & Bruggemann, 2022; Kamel, 2021). These studies have contributed valuable insights into the role of international organisations, governments, and multinational corporations in promoting sustainable

development. Nonetheless, sustainability at the organisational level, particularly within the HE sector in developing nations, has received limited attention (Abo-Khalil, 2024; Waham et al., 2023).

In higher education institutions (HEI) in developing countries, sustainability challenges are multifaceted and include not only environmental concerns but also financial, social, and institutional sustainability. Iqbal and Piwowar-Sulej (2022) argue that the limited number of studies on sustainability in HEI in developing countries underscores a gap in understanding how these institutions can contribute to sustainable development while ensuring their own operational viability. This is especially relevant in regions where universities play a critical role in shaping the next generation of leaders and driving societal progress. Despite the growing importance of sustainability in the global discourse, there remains a need for more focused research on how HEI in developing countries can incorporate sustainable practices into their operations and governance structures (Abo-Khalil, 2024; Waham et al., 2023).

This research seeks to comprehensively examine the relationships between TI, the KMP, SP, and OA within public HEI in the United Arab Emirates (UAE). Specifically, the study aims to explore how TI and the KMP influence the dynamics of both SP and OA in the context of the UAE's public HE sector. By focusing on these key factors, this study assesses the extent to which public HEI can leverage TI and effective KM to achieve SP and foster OA. A critical aspect of this research is the exploration of the mediating role of SP. Beyond merely investigating the direct effects of TI and the KMP, this study also examines whether SP acts as a mediator, facilitating the connection between TI, KMP, and OA.

This research is driven by the recognition that HEI, particularly in the UAE, are undergoing significant transformations due to rapid technological advancements and the increasing need for efficient KMP. In the UAE, public HEI play a pivotal role in the country's ambition to build a knowledge-based economy. As such, understanding the interconnections between TI, the KMP, SP, and OA is crucial for these institutions to remain competitive and responsive to change. This study aims to provide valuable insights into how public HEI can enhance their agility, sustainability, and KM as well technology by integrating these key elements effectively.

1.1.1 Overview of UAE

Since its formation in 1971, the UAE, comprising seven emirates, has shifted from a predominantly oil-based economy to one of the world's prominent centers for trade, finance, and innovation. The UAE's unique geographic position, connecting Europe, Asia, and Africa, has enhanced its role in global commerce, while consistent political stability and forward-looking leadership have driven its continuous economic development (Abdullah, 2020).

The UAE's economy has traditionally depended on oil and gas exports, with Abu Dhabi, holding the largest share of the country's oil reserves, playing a central role in this sector. However, recognising the limitations of an oil-dependent economy, the UAE has pursued extensive diversification strategies. These efforts have been particularly visible in Dubai, which has emerged as a leading global city and a centre for tourism, real estate, international business, and innovation. The construction of iconic landmarks such as the Burj Khalifa and the development of the Palm Jumeirah are symbolic of Dubai's ambition to position itself as a global metropolis (Cruz & Shukla, 2020).

At the heart of the UAE's development is a clear commitment to innovation and future-oriented policies. The government has articulated ambitious goals through initiatives like "UAE Vision 2021" and "UAE Centennial 2071," which aim to foster a knowledge-based economy, promote sustainability, and enhance technological capabilities. These initiatives have led to significant investments in critical sectors such as education, healthcare, and renewable energy (Abdullah, 2020). One notable example is Masdar City in Abu Dhabi, a pioneering urban development that integrates sustainable design and renewable energy solutions, positioning the UAE as a leader in the region's transition to a low-carbon economy (Cruz & Shukla, 2020).

TI is a key pillar of the UAE's development strategy. The country has rapidly embraced advanced technologies such as AI, blockchain, and smart city infrastructure, aiming to become a global leader in these areas. This focus on technology is supported by a regulatory environment that encourages innovation and investment, ensuring that the UAE remains competitive on the global stage (Alam et al., 2024; Kalaitzi & Chamberlain, 2020).

Education is another cornerstone of the UAE's vision for the future. The government has placed a strong emphasis on developing a world-class education system that can support the nation's broader economic goals (Shahbaz et al., 2020). Public and private universities in the UAE have increasingly attracted international students, and the country is positioning itself as a hub for HE in the Middle East. By fostering a highly skilled workforce, the UAE aims to transition away from its historical reliance on expatriate labour and cultivate homegrown talent capable of driving future innovation and economic growth (Shwedeh et al., 2023).

Sustainability also plays a central role in the UAE's long-term development agenda. In addition to renewable energy projects like Masdar City, the country has launched the "Green Growth Strategy" and other initiatives that aim to align economic growth with environmental sustainability. These efforts reflect the UAE's recognition of the global shift towards more sustainable development models, as well as its desire to be a leader in this transition within the Middle East (Baniissa et al., 2020).

The UAE's population, which exceeds 9 million people, is predominantly composed of expatriates, making it one of the most diverse and cosmopolitan societies in the world. This demographic diversity contributes to the UAE's status as a global business hub, fostering a multicultural environment that attracts foreign investment and talent (Alam et al., 2024; Alzard et al., 2021). The country's political stability, safety, and business-friendly policies further enhance its attractiveness as a destination for global commerce and investment (Cruz & Shukla, 2020).

1.1.2 Technological Innovation and Knowledge Management in Higher

Education in UAE

The UAE has experienced rapid economic and social transformation in recent decades, emerging as a regional leader in TI, education, and sustainability. The UAE's government has strategically prioritized economic diversification to reduce its reliance on oil revenues, aiming to establish a sustainable and resilient economy. This shift emphasizes the development of a knowledge-based economy, with significant investments in sectors such as technology, education, and renewable energy. Initiatives like the UAE Vision 2021 and the National Innovation Strategy highlight the government's commitment to fostering innovation, encouraging research and

development, and creating opportunities for high-skilled employment. By focusing on these areas, the UAE seeks to position itself as a global leader in knowledge-driven industries, thereby ensuring long-term economic stability and growth. Central to this vision is the country's HE sector, which plays a critical role in shaping the future workforce and fostering innovation. The UAE's public HEI are at the forefront of this transformation, tasked with integrating advanced technologies and KMP to enhance their agility and sustainability.

TI is a key driver of the UAE's shift towards a knowledge-based economy. The UAE has invested significantly in cutting-edge technologies, with initiatives like "UAE Vision 2021" and "UAE Centennial 2071" highlighting the role of technology in advancing education, healthcare, and other critical sectors. According to the Global Innovation Index (2023), the UAE ranks 32nd globally, reflecting its commitment to fostering a culture of innovation. In the context of public HE, institutions are increasingly adopting new technologies such as AI, blockchain, and digital learning platforms to enhance teaching and learning outcomes. However, while TI is advancing, challenges remain in fully integrating these innovations into institutional processes, which impacts the overall agility and sustainability of educational institutions.

The KMP is equally crucial for public HEI in the UAE. With an increasingly complex and competitive global educational landscape, managing institutional knowledge effectively is vital for maintaining relevance and competitiveness. KMP in the UAE's HE sector involve the systematic collection, organisation, and dissemination of information to improve decision-making, enhance operational efficiency, and foster collaborative learning environments. Despite these efforts, studies indicate that many

institutions face challenges in fully optimising KM systems, partly due to organisational silos and insufficient staff training in knowledge sharing (Migdadi et al., 2019). Addressing these issues is essential for improving OA, allowing institutions to adapt more quickly to changing educational and economic demands.

SP has also gained prominence in the UAE, particularly as the country strives to balance economic growth with environmental responsibility. The UAE government has introduced several initiatives, such as the "National Sustainable Development Strategy" and the "Green Growth Strategy," which aim to embed sustainability across all sectors, including education. Public HEI have responded by incorporating sustainability into their curricula and operations. According to the "Sustainability Report of UAE Universities" (2022), many universities are working towards reducing their carbon footprint, promoting renewable energy, and engaging students and staff in sustainability initiatives. However, achieving SP in HE requires a more comprehensive approach, integrating TI and KM to drive long-term sustainability goals.

OA is critical for public HEI in the UAE as they navigate a rapidly changing environment shaped by technological advancements, globalisation, and evolving student needs. Agility enables institutions to respond quickly and effectively to these changes, ensuring they remain competitive and innovative. Recent studies suggest that while some public HEI in the UAE have made strides in improving their agility through digital transformation and flexible learning models, others still face structural and bureaucratic barriers that hinder their ability to adapt swiftly (Al-Naqbi & Abdulla, 2020). Enhancing OA will require continuous investment in TI and the implementation of effective KMP.

The UAE's public HE sector is undergoing significant transformation, with TI, the KMP, SP, and OA playing key roles in shaping its future. While progress has been made in each of these areas, there is still a need for further integration and development to fully realise the UAE's vision of a knowledge-based, sustainable, and agile HE system. Addressing these challenges will be critical for ensuring that public HEI can meet the needs of a rapidly evolving society and economy. Therefore, this study is examining the interrelationship between these variables to enhance the explanation of SP and OA of public HE in UAE.

1.2 Problem Statement

A significant challenge facing HE in developing nations, particularly in the Arab world, is the lack of adaptability to sudden and unpredictable environmental changes. This issue is especially pronounced in the UAE, where HEI struggle to quickly respond to external factors such as technological disruptions and global crises (Qtairi & Alshoraty, 2022). While the UAE has made commendable strides in modernising its education sector, there is a clear gap in data regarding how effectively universities have responded to events like the COVID-19 pandemic, which profoundly affected educational systems worldwide. This lack of data underscores the need for further research to assess the adaptability and responsiveness of UAE universities to such external shocks.

Innovation rankings provide some insight into the performance of UAE universities. According to the Federal Competitiveness and Statistics Centre (2024), in 2023, the UAE ranks 32nd out of 131 countries in global innovation, with a score of 42.1 out of 100. Therefore, there is significant room for improvement, especially in areas of knowledge and technology output, where the UAE ranks 59th, and creative output,

where it is positioned 45th. These rankings reflect moderate progress but also highlight the challenges faced by HEI in fostering environments that promote high levels of knowledge production, creativity, and innovation (Al Mazroui et al., 2024).

One of the main obstacles to improving the responsiveness and agility of HEI of UAE is the significant resistance to change, particularly regarding the implementation of new systems, technologies, and methods. Numerous studies have documented this resistance, often attributed to entrenched bureaucratic cultures, fear of failure, and insufficient training and support (Al Badi, 2018; Abo-Khalil, 2024; Cherian, 2020). Such resistance can delay the adoption of new strategies and hinder the ability of institutions to adapt to a rapidly changing global environment.

In an era characterised by rapid technological advancement and unforeseen challenges, such as the COVID-19 pandemic, OA is more important than ever (Akkaya & Mert, 2022). OA refers to the capacity of institutions to swiftly adapt to environmental changes, address emerging challenges, and foster innovation proactively (Saha et al., 2020). For universities in the UAE, developing OA is crucial to maintaining competitiveness in the global educational landscape and aligning with the nation's vision of becoming a knowledge-based economy. Public sector organisations and HEI in the UAE are increasingly aware of the need to enhance their OA. AlDhanhani (2021) notes that there is a growing recognition of the importance of being flexible and responsive to external pressures, particularly with advancing technologies and global disruptions. To address these challenges, HEI in the UAE must prioritise the integration of TI and effective KMP. These factors are crucial for driving OA and ensuring SP.

SP has also become an essential objective for HEI in the UAE (Hesham et al., 2024). As the country strives to balance economic growth with environmental and social sustainability, universities are expected to integrate sustainability into their teaching, research, and operations. Achieving SP requires institutions to manage knowledge effectively and innovate continuously to address immediate challenges and long-term strategic goals (Allam et al., 2024).

In terms of global rankings, UAE universities generally rank lower than their counterparts in other regional and Arab countries. These rankings are based on factors such as teaching, innovation, social contributions, and research output (Scimago, 2023; Times Higher Education, 2022). Khalifa University, the highest-ranked institution in the UAE, still trails behind several Gulf universities, with four universities from the Gulf region outperforming UAE institutions (Times Higher Education, 2022). On a global scale, Khalifa University ranks above 2,000, whereas other universities in the region, such as King Abdullah University of Science and Technology in Saudi Arabia (ranked 330th), King Saud University (439th), Amman Arab University in Jordan (967th), and Cairo University in Egypt (1,125th), are positioned significantly higher (Scimago, 2023).

In the UAE, as in other developing countries, the adoption of TI remains limited (Chen, 2020; Yuli et al., 2022). TI, broadly defined as "the use of tools and techniques that extend human capability and are new to an organisation" (Tidd & Bessant, 2020), includes technologies such as the IoT and smart universities, which are still in the early stages of development. Research on the implementation of these innovations within HE remains limited (Cranmer et al., 2022; Rico-Bautista et al., 2021). Recently, the

metaverse has been explored as an innovative tool in HE, offering potential to enhance universities' research and development capabilities (Al-Adwan et al., 2023). By fostering greater collaboration across departments and faculties, TI can facilitate the sharing of knowledge and resources, contributing to a more integrated and dynamic academic environment (Al-Adwan et al., 2023; Edem Adzovie & Jibril, 2022).

Another crucial factor is the KMP, defined as a sequence of phases that involve capturing, storing, disseminating, and utilising knowledge (Chang & Lin, 2015). The effective use of KMP in HE, particularly in the public sector, remains limited (Baptista Nunes et al., 2017; Shannak et al., 2017). UAE universities must improve their agility and sustainability to enhance their overall performance and global rankings. In 2022, the UAE ranked 52nd in terms of publication output, lagging behind regional countries such as Iraq (42nd), Saudi Arabia (18th), Turkey (17th), and Iran (15th) (SCImago, 2023). TI and KMP are key factors that can contribute to OA and SP, yet few studies have examined their effects in the context of HE in developing nations.

TI, such as digital transformation and Industry 4.0, have the potential to improve universities' agility and contribute to better SP (Sarfranz et al., 2022). The resource-based view (RBV) theory suggests that organisations can leverage their resources and capabilities to strengthen competitiveness and improve overall performance, including OA (Bi et al., 2013; Zaini et al., 2018). However, the literature on the use of technology and its impact on OA and SP is mixed. Some studies have found that TI does not significantly affect sustainable competitive advantage (Patil et al., 2016), while others indicate no impact on OA (Keshavarz et al., 2015). Additionally, the association between TI and OA is still emerging, with much of the prior literature focused on

conceptualising the relationship (Jones & Wynn, 2021; Kamel, 2021; Mrugalska & Ahmed, 2021; Ufua et al., 2021). Khaw et al. (2022) highlight that organisational members often lack the ability to foresee and lead digital technology initiatives in their organisations. Thus, this study seeks to examine the impact of TI on SP and OA in the context of HE in the UAE.

The knowledge-based view (KBV) suggests that effective KM is essential for enhancing an organisation's competitiveness and readiness to face external changes (Hosseini et al., 2021). However, the literature presents mixed findings regarding the impact of KMP. Empirical studies demonstrate that there is no significant link between KM and organisational outcomes (Kusuma & Efendi, 2022; Mantow & Nilasari, 2022; Rianto et al., 2021; Syahchari & Sahban, 2019), while others have demonstrated a significant impact (Habibzadeh & Valizadeh, 2021; Salehi et al., 2021; Sari et al., 2022; Suryawan, 2020). Moreover, knowledge sharing (KS) has been found to have little effect on OA in some studies (Keshavarz et al., 2015). Further research is needed to explore the relationship between KMP and organisational outcomes, particularly in the context of HE (Ode & Ayavoo, 2020). Thus, this study examines the role of KM in enhancing SP and OA in HEI of UAE.

Given the mixed findings on the relationship between TI, KMP, and OA, the presence of a mediator such as SP may help clarify these relationships. SP is crucial for organisations seeking to achieve social, economic, and environmental goals (Shahzad et al., 2020). However, most existing studies focus on sustainability at a macro level, particularly in relation to the SDGs of the UN (Arora & Mishra, 2019; Bebbington & Unerman, 2018; Carlsen & Bruggemann, 2022; Kamel, 2021). At the organisational

level, especially in HE, research on sustainability is limited. Moreover, few studies have explored the mediating role of SP between TI, KMP, and OA. For example, sustainability has been shown to mediate the relationship between strategic planning and organisational performance (Almansoori, 2021).

The decision to use OA as the dependent variable instead of SP is grounded in both theoretical foundations and practical research objectives. The primary aim of this study is to explore how public universities in the UAE can enhance their adaptability to environmental changes, technological disruptions, and evolving educational needs. OA directly represents this capacity for adaptation and responsiveness, making it the most relevant dependent variable to achieve the study's objectives (Lu & Ramamurthy, 2011; Panda & Rath, 2018).

In contrast, SP is conceptualized as a mediating variable because it functions as an enabler rather than the ultimate outcome. While achieving SP is critical for public universities, it is not the endpoint but rather a mechanism that enhances agility. SP, encompassing environmental, social, and economic dimensions, provides a foundation for resilience and adaptability, thereby fostering agility. This positioning aligns with the RBV and KBV, which emphasize the role of internal resources and capabilities, such as sustainability initiatives, in achieving superior organizational outcomes like OA (Barney, 1991; Grant, 1996).

Focusing on OA as the dependent variable addresses a significant gap in the literature. Existing studies have primarily examined SP in isolation at the organizational level, often overlooking its relationship with TI and OA. Moreover, the role of SP as a

mediator between TI and OA remains underexplored, particularly in the context of higher education institutions in developing nations. By prioritizing OA, this study contributes to a deeper understanding of how universities can leverage technological and knowledge resources to enhance their responsiveness in dynamic and competitive environments (Kamel, 2021; Ode & Ayavoo, 2020).

From a practical perspective, positioning OA as the dependent variable underscores its strategic importance for public universities in the UAE. Agility enables institutions to navigate challenges, including technological advancements and stakeholder demands, while maintaining operational excellence. SP, as a mediator, demonstrates how sustainability initiatives can strengthen agility, aligning with the UAE's vision for a knowledge-based and sustainable economy (Baniissa et al., 2020; UAE Vision 2021).

Thus, the main objective of this research is to investigate the relationships between SP and OA within the context of HEI in the UAE. The overarching aim is to develop a comprehensive framework that provides valuable insights for decision-makers in the UAE's HE sector, ultimately serving as a practical guide for enhancing both SP and OA in universities across the country.

1.3 Research Questions

Building upon the issues outlined in the problem statement, this research endeavour is designed to address and provide comprehensive insights into the following critical questions:

1. What is the effect of TI on SP and OA of public universities in UAE?
2. What is the effect of KMP on SP and OA of public universities in UAE?

3. What is the effect of SP on OA of public universities in UAE?
4. Does SP mediate the effect of TI and KMP on OA of public universities in UAE?

1.4 Research Objectives

The general objective of this study is to examine the effect of TI and KMP on SP and OA of universities in UAE. The objectives of this research are listed as follows:

1. To examine the effect of TI on SP and OA of public universities in UAE.
2. To investigate the effect of KMP on SP and OA of public universities in UAE.
3. To identify the effect of SP on OA of public universities in UAE.
4. To determine the mediating role of SP, mediate between TI and KMP, and OA of public universities in UAE.

1.5 Significance of the Study

This study is significant for both theoretical and practical reasons, offering valuable contributions to the academic literature and real-world applications. Theoretically, it enriches the existing body of knowledge by introducing novel perspectives and frameworks that enhance understanding of the study's core concepts and relationships. This contribution not only fills identified gaps in the literature but also lays a foundation for future research in this area. Practically, the study addresses pressing challenges faced by industry and policy sectors, providing evidence-based recommendations that can shape policy decisions, improve organisational strategies, and inform industry practices. The subsequent sections discuss these theoretical and practical significance in detail, demonstrating the study's relevance and utility for academics, practitioners, and policymakers alike

1.5.1 Theoretical Significance

This study holds significant importance due to its examination of SP and OA, two critical factors for institutional success. While prior research has predominantly focused on SP at a macro level, such as national or global frameworks, this study contributes by investigating SP at the organisational level, specifically within public HEI. Moreover, research on OA has traditionally concentrated on the manufacturing sector, leaving a gap in understanding how agility functions in non-commercial environments. By focusing on OA within the context of HE in the UAE, this study addresses a crucial gap in the literature and provides insights into a sector that plays a pivotal role in the country's knowledge-based economy.

Additionally, the study is noteworthy for its examination of two emerging and underexplored variables: TI and the KMP. Although these variables have gained increasing attention in recent years, the literature still indicates a scarcity of studies that rigorously explore their impact, particularly in the context of HEI (Ode & Ayavoo, 2020). This study addresses the need to further investigate TI and the KMP, particularly given the mixed findings in the literature regarding their effects. By focusing on HE in the UAE, this research contributes to resolving some of the uncertainties surrounding the role these variables play in enhancing institutional performance.

A further contribution of this study lies in its investigation of the mediating role of SP. Few previous studies have explored the potential for SP to mediate the relationship between TI, the KMP, and OA. By considering SP as a mediator, this study explores how improvements in TI and the KMP can lead to enhanced OA through the mechanism

of SP. This approach offers a thorough understanding of the interactions among these variables and their collective impact on institutional success.

Moreover, this study employs a theoretical framework that combines the knowledge-based view (KBV) and the resource-based view (RBV), two prominent theories in the field of organisational studies. By integrating these theories, the research offers a robust explanation of how internal resources and capabilities, such as knowledge and innovation, influence SP and OA. The combination of these theories strengthens the study's contribution by offering a deeper and more nuanced explanation of the relationships among the variables.

1.5.2 Practical Significance

The practical significance of this study is rooted in its potential to benefit various stakeholders, including decision-makers in HE, students, lecturers, the community, and the government. One of the key contributions of this research is its ability to provide empirical evidence on the relationships between SP and OA, offering valuable insights for decision-makers in HE. By leveraging the findings, decision-makers can implement strategies to enhance the SP and agility of institutions. Furthermore, the study sheds light on the critical roles of TI and the KMP in driving these outcomes, thereby equipping decision-makers with knowledge to strengthen institutional resilience and responsiveness to change.

For students and lecturers, the study holds particular importance. In highly agile universities, students benefit from a learning environment that can adapt swiftly to external changes, ensuring continuity and flexibility in their education. This is

especially crucial in contexts such as the recent global pandemic, where institutions were challenged to maintain learning amidst significant disruptions. Lecturers may experience increased job security in institutions that exhibit high levels of OA, as these institutions demonstrate a greater capacity to adapt to evolving educational demands and external pressures while maintaining operational stability. Such adaptability not only supports stable employment for academic staff but also cultivates an environment conducive to professional growth and development. Therefore, OA within universities plays a pivotal role in enhancing both job stability and career advancement opportunities for lecturers, underscoring its importance in the academic sector.

The broader community also stands to gain from the findings of this study. Universities that effectively integrate TI and KMP are well-positioned to produce graduates who are not only proficient in current industry standards but also adaptable to the shifting demands of the labour market. By embedding TI and KMP into their curricula and institutional practices, these universities can enhance the relevance and quality of education, equipping students with both practical skills and a foundation of knowledge that supports lifelong learning and adaptability. Consequently, graduates from such institutions are more likely to excel in dynamic professional environments, meeting and exceeding the competencies sought by employers in a rapidly evolving global economy. These well-prepared graduates contribute positively to the community by delivering high-quality services and fostering innovation in various sectors. As such, the study indirectly supports community development by highlighting the importance of robust university practices in shaping the workforce of the future.

For the government of the UAE, the significance of this research extends beyond the educational sector. Agile and sustainable universities have the potential to attract students from around the world, positioning the UAE's HEI as global leaders and fast responders to change. This competitive advantage not only enhances the global reputation of the country's universities but also aligns with the government's strategic vision of transitioning towards a knowledge-based economy. Furthermore, by emphasising the role of cutting-edge technology and efficient KM, the study supports the government's agenda to harness technological advancements and ensure that UAE universities remain at the forefront of innovation and excellence in education.

1.5.3 Methodological Significance

The significance of this study lies in its multifaceted contribution to both methodology and the research context. Firstly, it addresses four interrelated domains; technology, knowledge, sustainability, and agility, offering a comprehensive exploration of how these areas intersect, particularly in the context of HE. This wide-ranging scope facilitates a more profound understanding of the interactions between these variables, a combination that has received limited attention in prior research.

Secondly, the study adds value by incorporating advanced statistical techniques such as Smart PLS 4 to examine the mediating role of SP, providing a robust methodological framework. This approach enhances the precision and reliability of the findings, particularly in exploring complex relationships between variables. Furthermore, while variables like TI and SP are often measured using secondary data in other studies, this research distinguishes itself by using a primary data approach. Data is collected through

questionnaires, allowing for direct engagement with the participants and providing fresh insights based on real-time responses.

Further, this study is significant from methodological perspective because it concentrates on one of the developing countries, specifically within the public sector, further underscores its significance. Research in this area is often limited, particularly in the context of public HEI in the UAE. By examining this underexplored area, the study fills a gap in the literature and offers findings that are relevant to policymakers and practitioners in similar contexts. Lastly, the study's design ensures that the findings have the potential for generalisation beyond the immediate context of the UAE. By addressing widely applicable variables such as TI, KMP, SP, and OA, the research can inform strategies in other developing countries and sectors, contributing to broader academic discourse and practical application.

1.6 Scope of the Study

This study is conducted within the context of the UAE, with a specific focus on public universities. The decision to concentrate on public institutions is informed by the substantial differences in funding mechanisms, governance structures, and regulatory frameworks compared to private universities. These distinctions significantly shape institutional policies, resource management, and strategic priorities, which are central to the study's exploration of key variables. By focusing on public universities, the research aims to yield insights that are particularly pertinent to the public sector within the UAE's higher education system. In UAE, there are several universities. However, these universities are branches of foreign universities. Only three public universities existed in UAE and these universities are the target population.

The three public universities in the UAE are 1) UAE University (UAEU). This university was established in 1976, and it is the first and one of the most prestigious universities in the UAE. Located in Al Ain, UAEU provides a comprehensive array of undergraduate and postgraduate programs across diverse fields, including business, engineering, humanities, and social sciences, reflecting its commitment to a broad-based educational approach. Zayed University (ZU), established in 1998 and with campuses in Abu Dhabi and Dubai, is named in honour of the UAE's founding father, Sheikh Zayed bin Sultan Al Nahyan. ZU offers a range of programs at both undergraduate and postgraduate levels, with specializations in business, communications, arts, and technology, aimed at preparing students for dynamic professional environments. The Higher Colleges of Technology (HCT), founded in 1988, stands as the largest public higher education institution in the UAE, with an extensive network of campuses across the nation, providing access to a wide array of vocational and academic programs tailored to meet the country's workforce needs. It focuses on technical and vocational education and offers programs in applied sciences, business, engineering, and technology. These three public universities are the target population in the study, aligning with the focus on HE in the UAE.

The study targets middle management staff within the three public universities in the UAE making the universities themselves the unit of analysis, while the middle management serves as the proxy respondents. These individuals are key stakeholders in understanding the dynamics of TI and KMP within their institutions. The study investigates OA as the dependent variable and SP as the mediating variable, aiming to explore the interplay between these crucial factors. A quantitative research methodology is employed, and data collection is facilitated through the use of a structured

questionnaire. This approach allows for the systematic collection of data to test hypotheses related to the effects of TI and KM on OA, as well as the mediating role of SP. The use of middle management as respondents provides valuable insights into operational and strategic processes within the universities, particularly given their involvement in implementing and overseeing innovations and KMP.

1.7 Definition of Terms

The subsequent definitions aim to provide clear delineations of the concepts employed within this study. These definitions encompass both theoretical and operational definitions of the terms.

1.7.1 Organisational Agility

OA refers to “the ability of an organisation to effectively adapt and respond to unexpected changes in operational contexts. This involves swiftly and creatively leveraging these changes as opportunities for growth and success” (Lu & Ramamurthy, 2011). In this study, it denotes the capacity of public universities in the UAE to adapt proactively and effectively to shifts within the business environment.

1.7.2 Sustainable Performance

SP in “a simple definition refers to the triple bottom line, individuals, and planet gain” (Sulasmi et al., 2020). This term refers to “the organisation's ability to manage and coordinate the processes related to its environmental, social, and economic activities, both in the short and long term” (Searcy, 2012). In this study, it is defined as the contribution of the public university in UAE in term of the social, economic and environmental perspectives.

1.7.3 Technological Innovation

TI can be described as "a contextually novel progression wherein individuals expand their influence over their surroundings" (Carayannis et al., 2015). It is also defined as "the use of tools and techniques which extend human capability and which are new to an organisation" (Tidd & Bessant, 2020). In this study, it is defined as the process by which the public universities in UAE used technology to create a new method of teaching and learning to respond to the changing environment. This could include cloud computing e-learning, IoT, and other technologies that facilitate the learning and teaching process. Since the HEIs are service organisations, the service that can be provided by these organisations is the focus of this study, and it can be the teaching and learning method as well as the publications and the ability to use technological tools to find solution to challenges.

1.7.4 Knowledge Management Process

The KMP is described as a sequence of phases that involve capturing, storing, disseminating, and utilising knowledge (Chang & Lin, 2015). In this study, the term "KMP" refers to the process of acquiring, sharing, and applying knowledge by organisational member in public universities in UAE. This process helps public universities in the UAE improve their SP and OA and effectively adapt to changes in their operational environment.

1.8 Organisation of the Study

This study is organized into five chapters, each addressing a key component of the research. The first chapter introduces the research problem, objectives, and significance, setting the foundation for the study. The second chapter provides an in-depth literature

review, examining relevant theories, concepts, and previous studies to contextualize the research within the existing body of knowledge. Chapter three outlines the research methodology, detailing the approach, data collection methods, and analytical techniques employed to investigate the research questions. The fourth chapter presents the analysis of the collected data and key findings, offering insights derived from the empirical evidence. Finally, chapter five includes a discussion of the results in relation to the literature, followed by the study's conclusions, implications, and recommendations. The following paragraph provides a brief overview of each chapter's main elements

Chapter 1: Introduction

This chapter provides a thorough examination of the study's background and presents the problem statement that serves as its central focus. The objective of this study is to analyse the factors influencing OA and SP, as well as the issue associated with these variables. Additionally, the study explores the complexities related to TI and KMP. The study's background, which provides the basis for this research endeavour was discussed. Through an analysis of the contextual foundations, the objective is to establish a comprehensive framework for comprehending the current issues. Next, the chapter discusses the problem statement, which is a crucial component that establishes the objectives and scope of the research. This study aims to address the questions that drive this research, providing a foundation for a thorough investigation. In addition, the chapter discussed the ever-changing field of TI and acknowledge its significant impact on the current landscape. Through an examination of the complex nature of technological advancements, the study aimed to acquire a deeper understanding of the potential effects these innovations may have on the issues being investigated. The research encompasses the field of KMP, which is a crucial element in contemporary

organisations. The significance of the study was discussed in this chapter along with the scope and definition of the terms that are used in this study. The structure of the thesis was presented.

Chapter 2: Literature Review

Chapter two of this study extensively examines the literature on OA, SP, TI, and the KMP. This chapter provides a crucial basis for this research by analysing pertinent theories, concepts, variables, and relevant studies. This chapter begins by discussing the theoretical perspectives of RBV and KBV, which are essential for developing the analytical framework. After establishing the theoretical foundation, the study proceeds to review the OA and SP. This is followed by a thorough review of the relevant literature in this research field. The aim of reviewing the literature is to provide an overview of the academic field, to summarise the main findings and insights from prior literature, and to identify areas where further research is needed. The presence of these gaps is of utmost importance, as they serve as the basis for the distinctive contribution of this research. Therefore, the study conducted a thorough gap analysis to highlight the specific areas in which this study aims to make a substantial contribution to the current body of academic research. Next, the study develops a conceptual framework and the hypotheses of this study.

Chapter 3: Research Methodology

This chapter provides an overview and explanation of the “research methodology” utilised in this research. The chosen research design is outlined to provide a framework for the entire study. The selected design should be in accordance with the research objectives and questions, offering a systematic method for gathering and analysing data.

The following section provides an overview of the population being studied, including its characteristics and scope. Furthermore, this study examines the methodologies and techniques employed in the sampling process, providing insight into the selection of the sample and the underlying rationale for this selection. Data collection methods in this study is conducted using a survey questionnaire. The chapter also discusses the validity and the reliability. The study presents a comprehensive description of the data collection process, outlining the sequential steps that were undertaken. The chapter also discusses the data analysis methods used in the study and provides an explanation for the reasoning behind the selected methodologies and software utilised for data analysis.

Chapter 4: Data Analysis and Findings

This chapter presents the study results in seven sections. It begins with an overview, followed by a discussion on data examination, including checks for “missing values, outliers, normality, multicollinearity, and non-response bias”. The background and descriptive information of respondents and variables are then detailed. The fourth section examines the Smart PLS, followed by hypotheses testing, which covers both direct and mediating effects. The chapter concludes with a summary of the findings.

Chapter 5: Discussion and Conclusion

This chapter provides a comprehensive conclusion to the study, organized across seven sections to systematically address the study’s outcomes and implications. It begins with an outline that introduces the chapter’s structure and purpose. The second section presents a validation of the study's findings through expert interviews, lending credibility and contextual depth to the results. Following this, the third section engages in a detailed discussion of the findings, critically analysing how they contribute to and

diverge from established literature. The fourth section examines the theoretical and practical implications, identifying the study's contributions to academic knowledge and its potential applications within the relevant field. In the fifth section, the limitations of the study are critically assessed, acknowledging factors that may impact the generalizability and interpretation of results. The sixth section then proposes directions for future research, suggesting ways to build upon and extend the insights presented here. Finally, the chapter concludes with a summary of the study's key findings, underscoring their significance and the study's contribution to the broader research landscape



CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents a literature review on OA, SP, TI, and the KMP. The chapter is divided into seven sections. The initial section provides an introductory overview of the chapter's content. After the introduction, the second section of this chapter discusses the theoretical framework, specifically focusing on the RBV and KBV theories. The following sections focus on OA and SP. The fifth section examines relevant studies in the context of TI and the KMP, establishing connections to this research area. The sixth section of the chapter identifies gaps in the existing literature and emphasises the need for further investigation in those areas. In the seventh section, the study presents a conceptual framework that integrates the theoretical foundations and literature review, providing a graphical depiction of the intersections and impact on this research. The final section of this chapter offers a summary, highlighting the main points discussed and setting the stage for the upcoming chapters of the study.

2.2 Theoretical Framework

The theoretical framework discussion in this study serves to establish a foundation for understanding the relationships between the core variables: TI, KMP, SP, and OA. The exploration of these associations is grounded in two key theories that provide insight into how organisations can enhance their sustainability and agility. The first theory is

the RBV, which forms the primary theoretical underpinning of this study. RBV is the underpinning theory of this study. Complementing the RBV is the KBV, which focuses on knowledge as a key strategic resource. By integrating these two theoretical perspectives, the study offers a comprehensive framework for analysing how TI and KMP influence SP and OA. The following sections explain and discuss each of these theories, exploring how they contribute to the study's understanding of the relationships between the variables.

2.2.1 Resource Based View

The RBV is a theoretical framework in management that centers on the internal resources and capabilities of an organisation as potential sources of competitive advantage (Armstrong & Shimizu, 2007). The theory pointed out that the sustained competitive advantage and superior performance of a firm is primarily determined by its distinctive combination of resources and capabilities (Lockett et al., 2009). As per the RBV theory, resources are the tangible and intangible assets that are possessed, governed, or obtained by an organisation (Yarbrough & Powers, 2006). On the other hand, capabilities denote the proficiency of the organisation in efficiently utilizing and deploying those resources (Kristandl & Bontis, 2007). Resources encompass a variety of elements, including tangible assets like manufacturing facilities and distribution networks, financial resources, intangible assets such as human capital, organisational structure, technology, patents, brands, reputation, and associations with suppliers, customers, and other stakeholders (Clulow et al., 2003; Connor, 2002).

The RBV theory posits that resources are not uniformly valuable or scarce, and that an organisation's competitive advantage can be attributed to resources that possess the

qualities of value, rarity, inimitability, and non-substitutability (Nevo & Wade, 2010). This viewpoint underscores the significance of organisations' identification, development, and utilization of their distinct resources and capabilities that fulfil the aforementioned criteria to attain a durable competitive edge (Aliyev & Kafouros, 2022). According to the RBV framework, companies are advised to allocate resources towards the procurement, enhancement, and safeguarding of their resources and capabilities (Kabue & Kilika, 2016). This should be done in a manner that is consistent with their strategic goals and objectives. Through this approach, organisations can establish obstacles to duplication by rivals, resulting in enhanced performance and sustained performance (Barney, 1991).

One of the criticisms of the RBV is the difficulty to measure the competitive advantages among organisations (Bromiley & Rau, 2016). However, several studies in the literature demonstrate the capability of RBV in explaining the association among variables. For instance, RBV was able to explain the strategic capabilities of SMEs in Germany and their organisational performance (Blind & Mangelsdorf, 2013). Chen et al. (2009) combined the RBV to understand the effect of organic growth, partnership growth, and acquisition growth on product and internationalization as well as the survival of high-tech companies in China. The theory was able to explain more than 47% of the variation in performance.

The RBV is the underpinning theory of this study. The theory has been used in several contexts to explain the intersections among the variables. However, similar to the context of this study, the RBV was deployed by Panda and Rath (2018) to explain the effect of IT capability and KMP capability on business process agility. It was also used to explain

the effect of inbound and outbound innovation on business model innovation and market capitalizing agility as well as operational adjustment agility (Liao et al., 2019). Other studies also used the theory to explain the collaborative knowledge creation and social capital on e-business proactiveness and OA (Al-Omouh et al., 2020). The effect of KMP on corporate SP as OA was explained using the RBV in the study of Shahzad et al. (2020).

The implementation and advancement of novel technologies can generate or amplify the characteristics of valuable, rare, inimitable, and non-substitutable (Zvarimwa & Zimuto, 2022). The successful implementation of innovation and technology by an organisation can provide it with distinctive and advantageous resources that may not be available to its rivals (Nava-Vázquez et al., 2020). Based on RBV theory, the capacity to innovate and efficiently manage technology-oriented resources can have a positive impact on achieving SP (Agrawal et al., 2024). Organisations can maintain a competitive edge and establish obstacles to replication by persistently investing in and enhancing their technological capacities. The implementation of new innovations has the potential to enhance operational effectiveness, output capacity, merchandise excellence, and consumer worth, thereby exerting a favourable influence on sustainable outcomes (Tegethoff et al., 2021).

The RBV also acknowledges the significance of knowledge as a valuable asset that can enhance an organisation's competitive edge through effective KMP. KMP encompass the procurement, generation, retention, dissemination, and utilization of knowledge within a given organisational context (Gold et al., 2001). The implementation of efficient KMP practices can enhance an organisation's capacity to recognize, cultivate,

and leverage valuable knowledge-centric resources and competencies (Mills & Smith, 2011).

RBV theory suggests that KMP have the potential to impact on both SP and OA. Through a methodical approach of acquiring and utilizing knowledge, organisations can improve their ability to make informed decisions, encourage creative thinking, promote education, and adjust to evolving circumstances (Maudsley & Strivens, 2000). The implementation of KMP can effectively facilitate the transfer of knowledge within an organisation, promoting collaboration and OA across various individuals, departments, and units (Patil et al., 2016). The RBV serves as the underpinning theory for this study due to its strong alignment with the research objectives and its ability to explain how internal organizational resources and capabilities contribute to sustainable competitive advantage. In this study, RBV is applied to analyse how TI and SP function as strategic resources and capabilities to enhance OA within public universities in the UAE.

The RBV is particularly relevant to this study as it provides a coherent framework to link resources (e.g., TI) with capabilities (e.g., SP) and outcomes (e.g., OA). Under the RBV framework, TI represents a valuable and rare resource that enables organizations to improve efficiency, foster innovation, and maintain competitiveness in dynamic environments (Barney, 1991; Teece, 2014). Public universities in the UAE, as knowledge-driven institutions, leverage TI to enhance their operational processes, adapt to rapid technological changes, and address evolving educational needs. These technological advancements are integral to the universities' ability to build and sustain a competitive edge, particularly in sectors characterized by high uncertainty and innovation (Kumari, 2023).

SP is conceptualized as a dynamic capability within the RBV framework, integrating economic, environmental, and social dimensions into organizational practices (Shahzad et al., 2020). By adopting sustainable practices, universities create a foundation for resilience and adaptability, allowing them to respond effectively to societal and environmental challenges. From an RBV perspective, SP enhances the transformative potential of technological resources, enabling institutions to optimize resource utilization while aligning with broader sustainability goals (Ode & Ayavoo, 2020).

OA, defined as the ability to adapt swiftly to environmental changes and uncertainties, represents a higher-order strategic outcome that results from effective resource deployment and capability building (Lu & Ramamurthy, 2011). In the context of public universities, OA enables institutions to navigate challenges such as technological disruptions and shifts in stakeholder demands. RBV provides a theoretical lens to understand how resources like TI and capabilities like SP are integrated to enhance organizational adaptability and responsiveness (Panda & Rath, 2018).

RBV is selected as the underpinning theory because it offers a comprehensive explanation of the relationships between resources, capabilities, and outcomes. RBV prioritizes the strategic deployment of internal resources and capabilities (Grant, 1996). This focus aligns with the study's objective to explore how internal capabilities, particularly TI and SP, drive agility in public universities. Furthermore, RBV complements the UAE's strategic focus on resource optimization and knowledge-based economic development, reinforcing its relevance to this research context (Baniissa et al., 2020). By applying RBV, this study extends the understanding of how internal resources and capabilities contribute to agility, particularly in the underexplored context

of public universities in developing countries. The integration of TI, SP, and OA into the RBV framework highlights the dynamic interactions among these variables, addressing gaps in the literature on resource utilization and sustainability (Teece, 2014).

From a practical perspective, RBV emphasizes the importance of investing in technological resources and sustainability initiatives to achieve strategic outcomes like agility. This insight provides actionable recommendations for university administrators and policymakers in the UAE, highlighting the need to prioritize resource development and capability enhancement to maintain competitiveness in a rapidly evolving educational landscape. Moreover, the findings align with the UAE's Vision 2030, which emphasizes sustainability and innovation as key drivers of national development (UAE Vision 2030). Therefore, this study deploys the RBV theory to explain the effect of TI which is a capability of the universities in UAE as well as the effect of KMP which can be internally developed, on the SP and OA of the public universities in UAE.

2.2.2 Knowledge based view

The KBV was developed based on RBV. The theory was developed by Grant (1996) to emphasize on the importance of knowledge. Grant (1996) pointed out that in order for an organisation to create a competitive advantage and a superior performance, there is a need to manage the organisational knowledge effectively (Grant, 1996). The KBV emphasizes the role of KC, acquisition, integration, and application in driving competitive advantage and organisational performance (Mahdi et al., 2019). The KBV suggests that knowledge, which includes both explicit and tacit knowledge, is a strategic asset that can differentiate organisations from their competitors (Stephan et al., 2019). It views knowledge as a resource that is valuable, difficult to imitate, and can generate

sustainable competitive advantage (Grant, 1996). The KBV extends the RBV's emphasis on resources by recognizing that knowledge is a key driver of innovation, learning, and adaptation (Grant, 1996).

One of the important aspects of the KBV is the KC. Organisations has to pay special effort for creating knowledge internally (Darwin, 2017). This can be achieved through research and development activities, experimentation, collaboration, and learning from both internal and external sources (Leistner, 2010). On the other hand, the knowledge acquisition (KAQ) should be implemented in organisations to extract and acquire a new knowledge from partners, customers and suppliers or in general from external sources (Kiessling et al., 2009). KBV also pointed out the importance of knowledge integration in which the organisational knowledge as well as the external knowledge can be integrated and disseminated in the organisation to help the KS among individual and across departments (Barley et al., 2018). The KBV also emphasised the importance of applying the knowledge in the process of creating a new service or product in case of manufacturing (Grant, 1996). The KBV acknowledges the dynamic nature of knowledge and the imperative for organisations to engage in ongoing learning and knowledge base refinement in order to maintain competitiveness. This entails cultivating an environment that prioritizes education, advocating for the dissemination and application of knowledge, and incentivizing innovation and flexibility (Grant, 1996).

Prior literature in the organisational and management context have deployed the RBV more frequently than KBV. This could be due to the fact that RBV includes tangible and intangible resources and capabilities. Nevertheless, Gold et al. (2001) who developed

the KMP Capability model have used KBV to explain the effect of KMP on organisational effectiveness. Blome et al. (2014) employed the theory to investigate the influence of knowledge transfer and complexity on the supply chain flexibility. Similarly, the study of Pollitte et al. (2015) employed the theory to identify the return of knowledge strategic alliance between American and Chinese companies.

In similar context to this study, the KBV was deployed by several researchers to explain the KMP and its impact on OA or SP. The effect of KS on SP and OA was explained using the KBV in the study of Marjerison et al. (2022). In the study of Rafi et al (2022) in Pakistan, the effect of KMP and KMP infrastructure on business performance and OA was explained using the KBV. In this study, the effect of KMP on SP and OA is expected to be explained by the KBV.

2.3 Organisational Agility

This section offers an in-depth analysis of OA, including its philosophical underpinnings, terminology, and significance within modern organisations. The section initially delineates OA by examining several viewpoints from existing literature, emphasising OA's capacity for rapid and effective adaptation to environmental fluctuations and emergent issues. Various theoretical frameworks regarding organisational agility are examined, illustrating its conceptualisation across disciplines such as management, information systems, and organisational studies. This section not only defines OA but also provides a historical review of the growth of agility, outlining its progression from first adaptation frameworks to its contemporary implementation in dynamic and competitive contexts. This historical backdrop lays the groundwork for comprehending the causes necessitating agility in contemporary organisations and the

advantages it offers, including increased resilience, higher performance, and enduring competitive advantage. The section also examines the several methodologies and criteria employed to assess OA, as recorded in prior research. This encompasses an analysis of prevalent indices of agility, including flexibility, response speed, and adaptability, along with the metrics created to measure these characteristics. This section evaluates several measuring tools to elucidate the strengths and limits of current OA metrics, finally determining the most reliable and valid techniques employed in the literature to estimate an organisation's agility level.

2.3.1 Definition of Organisational Agility

Several definitions of OA existed in the literature. For example, OA is defined “as an organisation-wide capability to deal with changes that often arise unexpectedly in working environments via rapid and innovative responses that exploit changes as opportunities to grow and prosper” (Lu & Ramamurthy, 2011). Other researchers viewed OA “as learned, permanently available dynamic capability that can be performed to a necessary degree in a quick and efficient fashion, and whenever needed in order to increase business performance in a volatile market environment” (Walter, 2021). OA also refers to “the ability to swiftly reconfigure resources to produce different products and services that meet the changing needs of the market” (Gagel, 2017).

The definition of Lu and Ramamurthy (2011) emphasized on the notion that OA is a comprehensive capability that spans the entirety of an organisation. This underscores the importance of organisational preparedness in effectively managing unforeseen alterations and disturbances within their operational contexts. The ability to respond to changes enables organisations swiftly and creatively to not only adjust but also leverage

these changes as avenues for expansion and success, thus attaining agility. Similarly, the definition of Walter (2021) places emphasis on the notion that OA is a dynamic capability that can be acquired and honed through learning. The definition underscores the significance of possessing the ability to execute tasks swiftly and effectively in reaction to dynamic situations. The definition highlights the correlation between OA and heightened business performance, especially in unstable market conditions where flexibility holds significant importance.

The definition of Gagel (2017) focused on the capacity of organisations to restructure their resources expeditiously and efficiently to cater to evolving market requirements. The definition focuses on the significance of the capability to pivot and adjust an organisation's offerings to conform to the changing demands of customers. It highlights the notion that the agility of an organisation is linked to its capacity to adapt its product or service portfolio in accordance with the fluctuations in the market. The three definitions highlighted the ability of organisations to respond effectively to change in their environment. However, the definition of Gagel (2017) and Walter (2021) are more into business organisations while the definition of Lu and Ramamurthy (2011) is more into the readiness of organisation face unforeseen changes in their environment. Therefore, the definition of Lu and Ramamurthy (2011) is adopted in this study.

2.3.2 Overview of Organisational Agility

The notion of agility was first introduced in 1982 and subsequently garnered organisational-level recognition in 1991. The notion of OA has undergone a transformation over the years, as organisations have encountered increasing complexity, market instability, and an urgent need for prompt adjustment. Agility has been an

important consideration when evaluating an organisation's competitiveness and capacity to prosper in uncertain market circumstances (Roblek et al., 2022). The importance of OA was mainly in the manufacturing sector. This is still an evident based on the number of studies that are dealing with the supply chain agility and the manufacturing process agility (Muduli, 2016; Sarfraz et al., 2022; Shahzad et al., 2020; Vinodh et al., 2011).

Recently, the recognition of agility's increasing importance across human, strategic, and organisational domains is widespread (King et al., 2022; Morton et al., 2018; Suherman, 2021). There is a growing recognition among organisations of the importance of developing agility across various dimensions in order to effectively navigate and address changes in their external surroundings (Sherehiy et al., 2007). Developing a mentality and culture that values and welcomes change is crucial for achieving this, as well as providing people with the knowledge and tools they need to adapt and innovate (Meyer, 2016).

Agility, at the human level, entails the development of a workforce that is capable of promptly adapting to changes, exhibiting flexibility, and maintaining an openness to change (Barakat, 2021). The process involves fostering a consciousness of the surrounding environment and fostering a constructive attitude towards changes (Holbeche, 2023; Muduli, 2017). It is imperative for organisations to establish a culture of learning that promotes ongoing growth and provides employees with the necessary competencies and expertise to effectively address changing requirements (Alavi et al., 2014; Karman, 2019).

From a strategic perspective, agility refers to the capacity of an organisation to identify and forecast shifts in the market, industry, or technological landscape (Weill et al., 2002). The process entails the development of strategic foresight, the examination of the external environment, and the proactive adaptation of strategies to exploit emerging opportunities or reduce potential threats (Doz & Kosonen, 2010). Organisations that adopt agile methodologies possess the ability to promptly and effectively make strategic decisions, while ensuring that their actions are in accordance with the present market dynamics (Weber & Tarba, 2014).

Agility at the organisational level refers to the ability to swiftly adjust to changes and utilize them to the benefit of the organisation (Marjerison et al., 2022). This pertains to the capacity to swiftly and efficiently adapt to dynamic situations by reorganizing resources, procedures, and frameworks (Walter, 2021). Agile organisations possess efficient and adaptable procedures that facilitate their ability to leverage opportunities and maintain a competitive edge (Gyemang & Emeagwali, 2020).

Several studies investigated the agility in various sectors mainly in the manufacturing (Almahamid et al., 2010; Keshavarz et al., 2015; Liu et al., 2014; Shahzad et al., 2020; Tooranloo & Saghafi, 2018; Zelbst et al., 2011), Small and medium enterprise (SMEs) (Gerald et al., 2020; Khazaei Pool et al., 2017; Liao et al., 2019), large organisation (Cegarra-Navarro et al., 2016; Felipe et al., 2017, 2020; Marjerison et al., 2022; Patil et al., 2016). All these studies were conducted in private sector while studies that are related to HE in the public universities are still limited (Iqbal & Piwowar-Sulej, 2022). Therefore, this study is focusing on the public universities in UAE.

2.3.3 Measurement of Organisational Agility

The measurement methods for OA have advanced alongside the development of OA as a research concept. Early research on agility focused on four main elements: customer sensitivity, network integration, virtual integration, and process integration, as identified by Van Hoek (2000). Sud-on and colleagues (2013) conducted research that improved the operationalization of agility in manufacturing companies in Thailand. This advancement resulted in the incorporation of a comprehensive framework consisting of four distinct components: customer responsiveness, flexibility, competency, and quickness.

Sud-on et al. (2014) further advanced the measurement of agility by introducing four dimensions for assessment. These dimensions include responsiveness, product flexibility, innovation competency, and delivery speed. This framework improved the ability to evaluate and comprehend the complex nature of agility in organisational settings. In contrast, the German approach to implementing agility was marked by a comprehensive and complex viewpoint. Agility was defined and measured across ten dimensions in this context, contributing to a comprehensive understanding of the concept. These dimensions include “speed, flexibility, innovation, proactivity, quality, profitability, customer orientation, transparency, cooperation, and entrepreneurship”. The detailed framework facilitated a comprehensive exploration of agility in Germany's organisational landscape.

In automotive industry, OA was measured using flexibility, power, accountability, and competence (Keshavarz et al., 2015). In the context of Iranian manufacturing sector, the OA was measured by “market, flexibility, competence, speed, and responsiveness”

(Tooranloo & Saghafi, 2018). However, the above studies are in manufacturing sector. Nevertheless, it can be seen that responsiveness, flexibility, and competence are commonly used by the above studies to measure the OA. One study in the HE has measured the OA by universities using a ten items that reflect the responsiveness, flexibility and competence (Iqbal & Piwowar-Sulej, 2022).

The measurement of OA has evolved alongside the development of the concept of OA. Researchers acknowledge the need to modify and improve measurement methods in order to accurately capture the complex nature of agility in various organisational settings. This evolution has undoubtedly enhanced the understanding of this crucial organisational characteristic and its consequences. Therefore, this study adopts the measurement of OA that is provided by Iqbal and Piwowar-Sulej (2022). The measurement is detailed in Chapter 3.

2.4 Sustainable Performance

This part focusses on a comprehensive analysis of academic publications pertaining to SP, establishing a basis for comprehending SP in the realm of organisational research. The section initially examines many definitions of SP, investigating its conceptualisation across multiple disciplines, including as management, environmental studies, and sustainability science. These definitions emphasise SP as an organisation's ability to attain economic, social, and environmental goals in a balanced fashion, hence guaranteeing long-term sustainability and resilience. This section explores the significance of SP, highlighting its contribution to sustainable development and ethical business practices. By attaining social performance, organisations enhance societal welfare while ensuring their competitive edge, which is increasingly crucial given

global environmental issues and stakeholder demands for responsible corporate conduct. This section offers a comprehensive analysis of the methodologies employed to assess SP, as documented in prior studies. Multiple methodologies for assessing SP are examined, encompassing quantitative indicators such as resource efficiency, carbon reduction, and financial sustainability. This section evaluates various instruments to build a comprehensive framework for correctly assessing SP, enabling comparisons across studies and providing insights into effective sustainability strategies.

2.4.1 Definition of Sustainable Performance

SP is defined as “a dynamic process that requires achieving short-term performance financial earnings without compromising long-term performance considering social and environmental impacts of the work” (Jaaron & Backhouse, 2019). SP in a simple definition refers to the triple bottom line, individuals, and planet gain (Sulasmi et al., 2020). In a detailed definition, it refers to “the ability of the organisation to manage the processes (planning, organizing, supervising) in the environmental, social, and economic activities in the short and long term” (Searcy, 2012).

In the definition of Jaaron and Backhouse (2019), the authors highlighted the dynamic nature of SP and the need to balance short-term financial goals with long-term considerations of social and environmental impacts. It recognizes that SP requires organisations to achieve profitability and financial success while also addressing their responsibilities towards social well-being and environmental sustainability.

The definition of Sulasmi et al. (2020) aligned with the concept of the triple bottom line, which emphasizes the simultaneous consideration of economic, social, and

environmental outcomes. SP goes beyond solely focusing on financial gains and recognizes the importance of creating value for both individuals (e.g., employees, stakeholders, communities) and the planet (e.g., environmental conservation, resource efficiency).

The definition of Searcy (2012) is adopted in this study because it provides a comprehensive view of SP, emphasizing the management of processes across environmental, social, and economic dimensions. It recognizes that SP is not limited to specific initiatives or actions but involves integrating sustainable practices into the core operations of the organisation. This includes considering environmental impacts, social responsibility, and economic viability in both short-term and long-term decision-making and activities.

2.4.2 Overview of Sustainable Performance

The UN in 2015 sets a 17 sustainability development goals referred to SDG to be achieved by 2030 (Anastas et al., 2021). Countries around the world have customized these goals into their national agenda and urged organisations to set sustainable goals (Arora & Mishra, 2019). In UAE, for instance, the government set an SDG Council. In addition, the SDG were aligned with the UAE vision of 2021 and its extension of 2030 (Umar et al., 2020). For this reasons not only in UAE, but everywhere else, the SP has gain increasing interest from the government level and the organisational level (Mrugalska & Ahmed, 2021). However, the national level studies outperformed the organisational level and there is a need for more studies in this regard.

Studies that are related to the organisational level of SP have operationalized the term to include three aspects. The economic aspect, social aspect, and environmental aspect (Ciemleja & Lace, 2011; de Silva et al., 2020; Epstein & Buhovac, 2014; Shahzad et al., 2020). The economic aspect is critical for the SP. Although SP encompasses more than just financial benefits, economic SP remains a crucial component (Epstein & Buhovac, 2014). The long-term sustainability of organisations is contingent upon their ability to generate profits and create economic value (Kamble et al., 2020). Nonetheless, the process entails the adoption of ethical and moral business strategies that take into account the effects on staff, suppliers, clients, and the broader society (Shahzad et al., 2020).

Researchers suggested that it is essential for universities to ensure their economic sustainability in order to uphold their mission and facilitate the provision of exceptional education and research (Malik, 2018). This entails proficiently managing financial resources, broadening revenue streams, and guaranteeing sustained financial stability (Ferrer-Balas et al., 2008). The implementation of sustainable financial practices within universities facilitates the allocation of resources towards the development of infrastructure, the recruitment and retention of highly skilled faculty and staff, and the provision of financial aid, such as scholarships, to students (Jongbloed et al., 2008; Michelsen, 2015).

In term of the social SP, the concept of SP encompasses the evaluation of an organisation's operational activities with regard to their social impacts (Alipour et al., 2019). The concept entails the advancement of societal welfare, the recognition and appreciation of differences, the incorporation of all individuals, and the implementation

of equitable employment policies (Shahzad et al., 2020). Organisations endeavour to achieve favourable social impacts by endorsing local communities, promoting human rights, guaranteeing employee welfare, and participating in charitable activities (P. A. Khan et al., 2021). In regard to social SP of a university, universities play a vital role in society and have a responsibility to contribute positively to social well-being (Alshuwaikhat & Abubakar, 2008). This involves providing equal opportunities for education and promoting diversity, inclusion, and social justice (Hargreaves & Goodson, 2006). Universities can engage with local communities, address social challenges through research and outreach programs, and promote civic engagement among students (Iqbal & Piwowar-Sulej, 2022).

The third aspect of SP is the environmental aspect. SP requires organisations to minimize their negative environmental impacts and promote environmental stewardship (Baboulet & Lenzen, 2010). This involves reducing resource consumption, adopting sustainable practices, managing waste and emissions, and promoting environmental conservation and protection (Marrone et al., 2018). Organisations aim to mitigate their carbon footprint, conserve natural resources, and contribute to the transition towards a low-carbon and circular economy (Ragazzi & Ghidini, 2017). In the context of a university, universities have a significant environmental footprint due to their facilities, energy consumption, transportation, and waste generation (Barros et al., 2020). SP in this context involves implementing energy-efficient practices, adopting renewable energy sources, promoting recycling and waste reduction, and minimizing water consumption. Universities can also integrate sustainability into their campus planning and design, incorporating green spaces and sustainable buildings (De Leo & Miglietta,

2015; Malik, 2018). This study examines the SP of public universities in UAE. The next section discusses the studies related to SP, OA, KMP, and TI.

2.5 Studies of Organisational Agility and Sustainable Performance

A comprehensive and thorough evaluation of the available literature was conducted to examine the associations between the variables under investigation and identify any gaps in the current academic knowledge. The present study included a full literature evaluation, which entailed an in-depth examination of scholarly articles and academic publications directly relevant to the research topic of this study. A set of keywords were used to search for articles. These keywords include OA, SP, TI, and KMP. The search resulted in a large number of articles. However, filtering process was conducted to select only the articles that meet the topic of this study. This has resulted in 35 articles. The articles are related to the effect of TI and KMP on SP and OA. Few of the articles were published before 2018 and the majority were between 2018-2024.

Among the early studies on KM and agility is the study of Almahamid et al. (2010) in Jordan which investigated the influence of KS and agile organisational practises on competitive advantage. Through the examination of 112 questionnaires, it was determined that KS and agile practises exerted a favourable impact on competitive advantage. This study highlights the significance of cultivating a culture of knowledge-sharing and agility within manufacturing organisations in order to achieve a competitive advantage. Zelibst et al. (2011) conducted a study in the US on the manufacturing industry to investigate the utilisation of RFID technology and its impact on operational and logistic performance. The study also investigated the role of OA as a mediator in this association. A survey was conducted on 328 individuals employed in the

manufacturing sector. The findings revealed that the utilisation of RFID technology had a positive effect on operational performance but had a negative impact on logistic performance. This association was mediated by OA.

Liu et al. (2014) conducted a study in China and investigated the impact of KMP capabilities on operational adjustment agility, market capitalising agility, and firm performance. The researchers found that the KMP capabilities had an impact on operational adjustment and market capitalising agility, which in turn influenced firm performance. Keshavarz et al. (2015) investigated the automotive industry in Iran. This study focused on the critical success factors of KMP in Iran's automotive industry. These factors include KS culture, senior management perspective, education and learning, the use of IT, and document repository. The study also assessed the influence of these factors on OA, flexibility, power, accountability, competence, and organisational performance. Based on a survey of 91 participants, this study found that senior management perspective, education and learning, and document repository have a positive impact on OA. These findings highlight the importance of leadership and knowledge resources in promoting OA.

Cegarra-Navarro et al. (2016) investigated the associations between KAQ, knowledge conversion (KCO), KAP, OA, and firm performance. The survey of 112 responses indicated the existence of an important association between KAQ, KCO, and KAP. In this context, the application of knowledge had a positive effect on firm performance, which was influenced by the mediating factor of OA. Mehdibeigi et al. (2016) in Iran, conducted a study on the banking sector to investigate the impact of KMP, specifically customer KMP, and OA on organisational effectiveness. The study, which analysed 130

responses, found that customer KMP had a direct positive impact on organisational effectiveness. Additionally, the study identified agility as a mediator in this association.

Patil et al. (2016) investigated the effects of TI and KMP on dynamic capabilities and OA within the context of public listed companies in Indonesia. The study, conducted with a sample size of 206 participants, found that TI and KMP had an impact on dynamic capabilities and OA, which in turn influenced the attainment of sustainable competitive advantage. Khazaei Pool et al. (2017) conducted a study in Iran focusing on SMEs. The study investigates the associations among organisational culture, KS, OA, and performance in Iranian SMEs. The study found that organisational culture had an impact on KS, which subsequently influenced OA and performance. Additionally, OA mediated the association between KS and performance.

In a study conducted by Felipe et al. (2017) in Spain, the focus was on large companies to examine the influence of organisational culture, age, size, and technology intensity on OA in large companies. The study found that different organisational cultures, with the exception of market culture, had a significant impact on OA. Furthermore, the age of organisations was found to have a significant impact, whereas size did not exhibit a significant influence. Moreover, the intensity of technology adoption was identified as a potential moderator for these effects. Tooranloo and Saghafi (2018) investigated the impact of implementing KMP on OA in the Iranian manufacturing sector. The research found that implementing KMP had a significant impact on OA in manufacturing companies.

Žitkienė and Deksnys (2018) developed a conceptual model that explores the association between OA and sensing, responses, capabilities, and enablers. The study emphasised the complex associations between these elements, with a particular focus on the role of OA in promoting organisational responsiveness and adaptability. Panda and Rath (2018) investigated the impact of IT capabilities and KMP capabilities on business process agility and market response agility within the banking and insurance sector in India. The researchers conducted an analysis of 300 responses and determined that both IT and KMP capabilities had a positive influence on agility. However, the impact of environmental factors on these associations was found to be mixed.

Ravichandran (2018) in the US investigated the connections between IS capabilities, investment orientation in IT, digital platform capabilities, innovation capacity, OA, and firm performance. A study of 129 responses revealed that the capabilities of IS and the orientation of IT investment had an impact on the capabilities of digital platforms, which subsequently influenced OA. The study found that OA positively impacted firm performance, highlighting the significance of IT and innovation in achieving organisational success. Liao et al. (2019) conducted a study in Chinese SMEs to investigate the impact of inbound and outbound open innovation on business model innovation. The study's results, derived from 245 responses, demonstrated a significant impact of inbound open innovation on business model innovation. This highlights the importance of incorporating external knowledge sources in the innovation process.

Alipour et al. (2019) conducted a study in an Iranian university to examine the influence of various factors, including green university initiatives, green management practises, green attitudes, green policies, and green education, on the sustainable development of

the environment. The study, which included 168 responses, found that the presence of a green university positively influenced sustainability development, with green IT acceptance acting as a moderating factor. Gyemang and Emeagwali (2020) conducted a study in the Nigerian telecommunication sector to examine the connections between KMP, dynamic capabilities, innovation, and competitive performance. The study, which analysed 341 responses, found a critical association between KMP and dynamic capabilities, innovation, and competitive performance. Dynamic capabilities have an impact on both OA and competitive performance, emphasising the interdependence of these factors.

Al-Omoush et al. (2020) conducted a study in Jordan's pharmaceutical and clean material industries to examine the impact of social capital and collaborative KC on e-business proactiveness, OA, and other related variables. The study, which collected 198 responses, found complex connections between social capital, e-business proactiveness, and collaborative KC, with social capital having a positive impact on both e-business proactiveness and collaborative KC. Collaborative KC has a direct impact on e-business proactiveness and OA. This impact is mediated by social capital, which plays a significant role in influencing e-business proactiveness.

In a study conducted by Shahzad et al. (2020) in Pakistan's manufacturing sector. The study focused on examining KMP, KAQ, knowledge dissemination, KAP, SP, environmental sustainability, economic sustainability, and social sustainability within the manufacturing sector in Pakistan. The analysis of 475 responses revealed the intricate connections between these variables, highlighting the significance of KMP in organisational sustainability and performance.

Felipe et al. (2020) in Spain, investigated the impact of IT capabilities on OA and firm performance in large organisations in Spain. The study, which analysed 153 responses, found that IT capabilities had a positive impact on firm performance. This effect was fully mediated by OA. Furthermore, the study revealed that the impact of IT capabilities on OA differed depending on the level of technological advancement in the industry. Saha et al. (2020) investigated the intersections between organisational learning, OA, and organisational competitiveness. This discussion highlights the interdependent connection between OA and organisational learning, which, when integrated, can result in improved organisational competitiveness. Gerald et al. (2020) conducted a study on SMEs in Nigeria to investigate the influence of OA on firm performance. The study, which included 272 responses, found that OA had a positive impact on firm performance, highlighting the importance of adaptability and innovation in SMEs.

Khan et al. (2021) conducted a literature review and developed a framework that proposes a correlation between green innovation, SP, and ISO IT management. The authors suggest that ISO IT management plays a moderating role in the association between green innovation and organisational sustainability practises, thereby enhancing our comprehension of sustainability practises within organisations. Ufua et al. (2021) investigated the impact of digital transformation, e-government, technology, SDG, education, industrialization, institutional framework, and stakeholder commitment on SD in Nigeria's education and industrialization sectors. This research highlights the crucial role of digital transformation in attaining sustainable objectives in the fields of education and industrialization.

Jones and Wynn (2021) conducted a literature review in the United States to highlight the role of digital transformation in promoting SD within the technological sector. Their research highlights the importance of digital transformation in promoting positive societal and environmental results. Mrugalska and Ahmed (2021) conducted a comprehensive review that emphasised the critical importance of OA in organisations. The authors conducted a comprehensive review of 381 papers, highlighting the significance of OA for organisations, particularly in the context of Industry 4.0 and the adoption of new technologies.

Kamel (2021) conducted a literature review that emphasised the crucial role of digital transformation in facilitating SD. The review highlights the wider significance of digital transformation in relation to the role of IT in sustainable development. Rafi et al. (2022) conducted a study in a Pakistani service organisation to examine the connections between KMP, KMP infrastructure, OA, and business performance. The study, which gathered data from 166 participants, found that KMP and infrastructure have a noteworthy influence on OA and business performance. The study also found that OA acts as a mediator in this association.

Marjerison et al. (2022) conducted a cross-industry study in China to investigate the impact of KS on SP and OA. The study, which collected data from 720 participants across five sectors, found that KS has a positive impact on OA and SP. Furthermore, the study revealed that OA mediates the association between KS and SP. Iqbal and Piwowar-Sulej (2022) conducted a study on HE in China and Pakistan. The study investigated the connections between sustainable leadership, social innovation, and SP in HE settings in China and Pakistan. Based on a survey of 500 participants, the study

found that sustainable leadership had a positive impact on social innovation, which subsequently influenced social performance. Furthermore, the influence of managerial discretion was observed as a moderating factor in these associations, highlighting the intricate nature of leadership dynamics.

Sarfraz et al. (2022) examines the impact of innovation capability, green process innovation, and green product innovation on SP in Pakistan's manufacturing sector. The moderating role of digital leadership was also taken into consideration. The study, which analysed 299 responses, found that innovation capabilities have a positive impact on SP. Additionally, the effect of green product innovation on SP is moderated by digital leadership. This study highlights the importance of innovation and leadership in attaining sustainability in the manufacturing sector.

Asril et al. (2023) conducted a study in Indonesia focused on the manufacturing sector. This study examines the correlation between KM, learning agility, and talented human resources (HR) in the manufacturing sector, with a focus on organisational sustainability and business excellence. The findings indicate that KM and learning agility do not directly result in business excellence. However, they do have a noteworthy influence on organisational culture, which subsequently affects sustainability and business excellence. The role of organisational culture is essential in facilitating the transformation of KM and learning agility into achieving business success. In addition, the study emphasises the significant impact of innovation and skilled HR professionals in attaining business excellence, both independently and by shaping organisational culture. It is crucial to promote a robust, innovation-focused culture within organisations in order to support long-term business success. Essentially, KM and

learning agility play a crucial role in shaping an organisational culture that fosters sustainability, innovation, and excellence.

In a study conducted by Rana and Ha-Brookshire (2023), the focus was on fashion retailers in the US. The primary objective of this study is to examine how KM can contribute to improving the agility and performance of supply chains in the fashion retail industry in the US. The authors utilise the KBV as a theoretical framework to showcase the significance of KM capabilities in enhancing supply chain agility. This, in turn, enables retailers to effectively address disruptions, including unforeseen challenges like the COVID-19 pandemic. The study emphasises the importance of KMP in the fashion retail industry. These practices, which involve sharing, storing, and utilising knowledge effectively, enable retailers to quickly adapt to market changes, enhance their responsiveness to supply chain disruptions, and sustain their performance. The study's findings support the KBV theory, which suggests that effective management of knowledge can enhance OA and performance, especially in dynamic industries such as fashion.

Martínez-Falcó et al. (2024) conducted a study on the Wine Industry in Spain. The authors examined the impact of KMP, green innovation, and collaborative culture on SP in the wine industry. The research indicates that implementing efficient KMP is crucial for enhancing SP, especially when integrated with environmentally friendly innovation. The role of green innovation is to act as a mediator in the connection between KMP and SP. This implies that KM plays a part in promoting sustainability by encouraging innovation that minimises environmental impact. In addition, the presence of a collaborative culture plays a crucial role in this relationship, as it improves the

effectiveness of KM and green innovation in attaining sustainable outcomes. The presence of a collaborative culture not only enhances internal processes but also facilitates the adoption of innovative, sustainability-focused practices within the wine industry.

In a recent study conducted by Ismail and Supanto (2024), the focus was on the manufacturing industry in Indonesia. This study investigates the correlation between KMP, OA, and business model innovation in order to enhance new product development performance in the manufacturing sector. The authors assert that KMP is crucial in facilitating organisations to effectively develop and launch new products by improving OA and fostering innovative business models. OA is crucial for companies to effectively implement KMP. It involves the ability to swiftly adapt to market changes. Business model innovation, in contrast, offers a structured approach to aligning KMP with the strategic objectives of the company. The study's findings indicate that incorporating KMP with these elements enables companies to better address market demands, enhance performance in new product development, and maintain a competitive advantage. This study supports the notion that KM, when paired with OA and innovative business strategies, plays a vital role in enhancing performance in dynamic industries such as manufacturing.

Throughout these studies, it is evident that KMP plays a crucial role in improving OA and SP. Research conducted by Rana and Ha-Brookshire (2023) and Ismail and Supanto (2024) highlights the significant impact of KMP on promoting OA. Martínez-Falcó et al. (2024) highlights the significance of KMP in attaining SP. The research emphasises that KMP, when coupled with green innovation, plays a crucial role in achieving this

goal. Through the facilitation of knowledge utilisation, KMP plays a vital role in enhancing both environmental and operational performance, leading to sustainable outcomes for organisations.

Overall, these studies demonstrate the significant impact of KMP on enhancing OA and SP. Integrating KMP with technology, collaborative culture, and OA has been shown to enhance business excellence and facilitate new product development. Furthermore, this integration plays a crucial role in promoting long-term sustainability across various industries. The articles are summarized in Table 2.1 and the association among variables are discussed based on the studies listed in the table.



Table 2. 1: Summary of Reviewed Studies

Author/year	Country	Industry	I.V	D.V	Med/mod	Theory	Method	Result
(Almahamid et al., 2010)	Jordan	Manufacturing	<ul style="list-style-type: none"> • KS • Agile organisation 	Competitive advantage	-	-	112 questionnaires	KS and agile organisation affected positively the competitive advantage.
(Zelbst et al., 2011)	US	Manufacturing	<ul style="list-style-type: none"> • RFID technology utilization 	Operational performance Logistic performance	OA (med)	Innovation diffusion theory	328 individual working in manufacturing	RFID technology utilization affected OA, operational performance and negatively logistic performance. OA acted as a mediator.
(Liu et al., 2014)	China	Manufacturing, finance, IT	<ul style="list-style-type: none"> • Exploration KM capability • Exploitation KM capability 	Firm performance	<ul style="list-style-type: none"> • Organisational adjustment agility • Market capitalizing agility 	-	211 responses	Exploration and exploitation KM capabilities affected operational adjustment agility and market capitalizing agility which in turn mediated the effect of exploitation and exploration KM capability and directly affected the firm performance.
(Keshavarz et al., 2015)	Iran	Automotive Industry	Critical success factor of KMP <ul style="list-style-type: none"> • KS culture • Senior management perspective • Education and learning 	OA <ul style="list-style-type: none"> • Flexibility • Power • Accountability • Competence 	-	-	91 responses	KS culture and use of IT did not affect the OA. Senior management perspective, education and learning, and document repository

Author/year	Country	Industry	I.V	D.V	Med/mod	Theory	Method	Result
			<ul style="list-style-type: none"> • The use of IT • Document repository 					affected positively the OA.
(Cegarra-Navarro et al., 2016)	Spain	Large companies	<ul style="list-style-type: none"> • KAQ process • KCO process • KAP process 	Firm performance	OA	-	112 responses	KAQ affected KCO which in turn affected the KAP. KAP affected positively the firm performance, and its effect was mediated by OA.
(Mehdibeigi et al., 2016)	Iran	Banking	<ul style="list-style-type: none"> • KMP 	Organisational effectiveness	OA	-	130 responses	Customer KMP affected organisational effectiveness and agility. Agility affected organisational effectiveness and mediated the effect of customer KMP on organisational effectiveness.
(Patil et al., 2016)	Indonesia	Public listed companies	<ul style="list-style-type: none"> • TI • KM 	Sustainable competitive advantage	<ul style="list-style-type: none"> • Dynamic capabilities • OA 	-	206 responses	TI did not affect the sustainable competitive advantage. KM and TI affected the dynamic capability and OA which in turn affected the sustainable competitive advantage.
(Khazaei Pool et al., 2017)	Iran	SMEs	<ul style="list-style-type: none"> • Organisational culture 	Performance	OA	-	324 responses	Organisational culture affected KS. KS

Author/year	Country	Industry	I.V	D.V	Med/mod	Theory	Method	Result
			<ul style="list-style-type: none"> • KS 					affected OA and performance. OA mediated the effect of KS on performance.
(Felipe et al., 2017)	Spain	Large companies	<ul style="list-style-type: none"> • Clan culture • Market culture • Adhocracy culture • Hierarchy culture • Age • Size 	OA	Technology intensity	-	172 responses	Type of culture except market culture play a significant effect on OA. The age is critical but not the size. The high technology intensity and medium can play a moderating role.
(Tooranloo & Saghafi, 2018)	Iran	Manufacturing	KM <ul style="list-style-type: none"> • Strategy • Executive 	OA <ul style="list-style-type: none"> • Market • Flexibility • Competence • Speed • Responsiveness 	-	-	142 responses	Applying KM has a significant effect on the OA
(Žitkienė & Deksnyš, 2018)	-	-	<ul style="list-style-type: none"> • Developing a conceptual model 	OA	-	Dynamic capability agility	Discussion	Sensing and responses are related to the capabilities and enablers of OA.
(Panda & Rath, 2018)	India	Banking and insurance	<ul style="list-style-type: none"> • IT capabilities • KM capabilities 	<ul style="list-style-type: none"> • Business process agility • Market response agility 	Environmental factors	RBV	300 responses	IT capability and KM capability affected business process agility and market response agility. There is mixed finding in term of the moderating role of environmental factors.

Author/year	Country	Industry	I.V	D.V	Med/mod	Theory	Method	Result
(Ravichandran, 2018)	US	Several industries	<ul style="list-style-type: none"> • IS capabilities. • IT investment orientation • Digital platform capabilities • Innovation capacity 	<ul style="list-style-type: none"> • OA • Firm performance 	-	-	129 responses	IS capabilities and IT investment orientation affecting the digital platform capabilities which in turn affected the OA. The Innovation capacity moderated the effect of digital platform capabilities on OA. OA affected firm performance.
(Liao et al., 2019)	China	SMEs	<ul style="list-style-type: none"> • Inbound open innovation • Outbound open innovation 	Business model innovation	Market capitalizing agility Operational adjustment agility	RBV Dynamic capability view	245 responses	Inbound open innovation but not outbound open innovation affected business model innovation.
(Alipour et al., 2019)	Iran	University	<ul style="list-style-type: none"> • Green university • Green management • Green attitude • Green policies • Green education 	SD of the environment	Green IT acceptance	-	168 responses	The dimension of green university has a positive effect on sustainability development. Green IT acceptance moderated the effect.
(Gyemang & Emeagwali, 2020)	Nigeria	Telecommunication	<ul style="list-style-type: none"> • Dynamic capability • KMP 	Competitive performance	Organisation agility Innovation	-	341 responses	KMP affected dynamic capability, innovation, and competitive performance. Dynamic capability affected organisation agility and

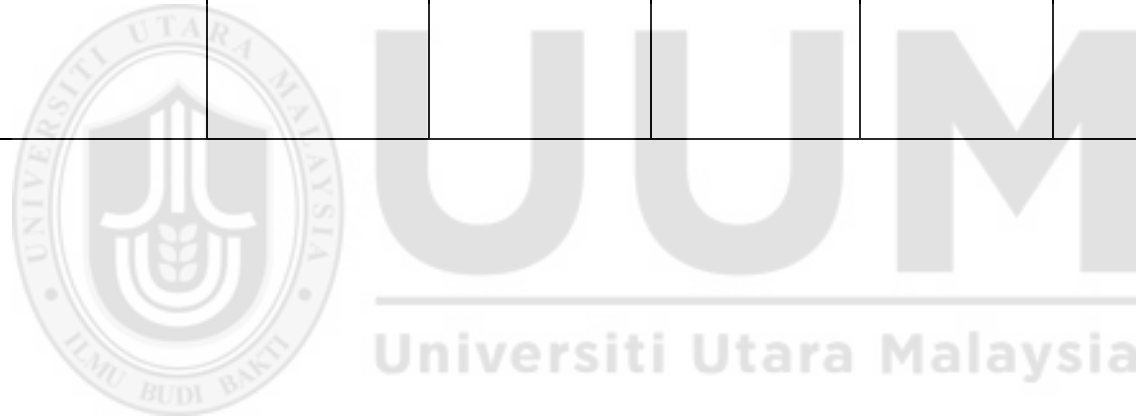
Author/year	Country	Industry	I.V	D.V	Med/mod	Theory	Method	Result
								competitive performance. Organisation agility and innovation affected competitive performance.
(Al-Omoush et al., 2020)	Jordan	Pharmaceutical and clean material	<ul style="list-style-type: none"> • Social capital • Collaborative KC 	<ul style="list-style-type: none"> • e-business proactiveness • OA 	Collaborative KC	RBV	198 responses	Social capital affected positively e-business pro-activeness and collaborative KC. Collaborative KC affected e-business and OA. In addition, it mediated the effect of social capital on e-business proactiveness.
(Shahzad et al., 2020)	Pakistan	Manufacturing	KMP <ul style="list-style-type: none"> • KAQ • Knowledge dissemination • KAP 	Corporate SP <ul style="list-style-type: none"> • Environmental sustainability • Economic sustainability • Social sustainability 	Green innovation OA	RBV	475 responses	KMP affected green innovation which affected the sustainability performance. OA affected green innovation but did not moderate the effect of green innovation on SP.
(Felipe et al., 2020)	Spain	Large organisations	<ul style="list-style-type: none"> • IT capabilities 	Firm performance	Technology intensity (Mod) OA (med)	-	153 responses	IS capabilities positively affect firm performance through the full mediation of OA. IS capabilities having larger effect on OA in

Author/year	Country	Industry	I.V	D.V	Med/mod	Theory	Method	Result
								high tech industries compared with medium tech industries.
(Saha et al., 2020)	-	-	<ul style="list-style-type: none"> • Organisational learning • OA 	Organisational competitiveness	-	-	Discussion	OA and organisational learning can affect each other, and both can lead to organisational competitiveness.
(Gerald et al., 2020)	Nigeria	SMEs	<ul style="list-style-type: none"> • OA 	Firm performance	-	-	272 responses	OA affected positively the firm performance.
(P. A. Khan et al., 2021)	-	-	<ul style="list-style-type: none"> • Green innovation 	SP	ISO IT management	Legitimacy theory	Discussion	The study reviewed the literature and proposed a framework of green innovation will affect the SP and ISO IT management will moderate this effect.
(Ufua et al., 2021)	Nigeria	Education and industrialization	<ul style="list-style-type: none"> • Digital transformation • E-government • Technology 	SDG Education Industrialization	Institutional framework Stakeholder commitment	Stakeholder theory Institutional theory	Review of the literature	Digital transformation is critical for achieving the sustainable goals of education and industrialization.
(Jones & Wynn, 2021)	US	Technological companies	<ul style="list-style-type: none"> • Technology 	SD	-	-	Review of the literature	Digital transformation can contribute to the SD.
(Mrugalska & Ahmed, 2021)	Review	Review	<ul style="list-style-type: none"> • Review - 	OA	-	-	Review of 381 papers	OA is critical for organisations. Most of studies focused on developed and emerging economies.

Author/year	Country	Industry	I.V	D.V	Med/mod	Theory	Method	Result
								Industry 4.0 such as new technology can lead to higher OA.
(Kamel, 2021)	Egypt	Review	<ul style="list-style-type: none"> Digital transformation 	SD	-	-	Review of the literature	Digital transformation is essential to support the achievement of the SD. Future studies should examine the role of IT in SD.
(Rafi et al., 2022)	Pakistan	Service organisation	<ul style="list-style-type: none"> KMP KM infrastructure 	Business performance	OA	KBV	166 responses	KMP and infrastructure affected OA and business performance. OA mediated the effect of KMP and infrastructure on business performance.
(Marjerison et al., 2022)	China	Several industries	<ul style="list-style-type: none"> KS 	SP	OA	KBV	720 responses from five sectors	KS affected OA and SP. OA mediated the effect of KS on SP.
(Iqbal & Piwovar-Sulej, 2022)	China and Pakistan	HE	<ul style="list-style-type: none"> Sustainable leadership Social innovation 	SP	Social innovation (Med) Managerial discretions (Mod)	Upper echelon theory	500 responses	Sustainable leadership affected social innovation which in turn affected the SP. The managerial discretions moderated the effect of sustainable leadership on social innovation. Social innovation mediated the effect of sustainable leadership on SP.

Author/year	Country	Industry	I.V	D.V	Med/mod	Theory	Method	Result
(Sarfraz et al., 2022)	Pakistan	Manufacturing	<ul style="list-style-type: none"> • Innovation capability • Green process innovation • Green product innovation 	SP	Digital leadership	-	299 responses	Innovation capability, green process innovation, and green product innovation have positive effect on SP. Digital leadership moderated the effect of green product innovation on SP.
(Asril et al., 2023)	Indonesia	Manufacturing	<ul style="list-style-type: none"> • KM • Learning agility • Talented HR 	Sustainability	Organisational culture	-	150 responses	While KM and learning agility may not directly lead to business excellence, they significantly impact organisational culture, which in turn affects sustainability business excellence. Innovation and talented HR are crucial for achieving business excellence directly and through their influence on organisational culture.
(Rana & Ha-Brookshire, 2023)	US	Fashion retailers	<ul style="list-style-type: none"> • KM 	Agility performance	-	KBV	320 responses	The study underscores the critical role of KM capabilities in enhancing supply chain agility and improving disruption mitigation performance for U.S. fashion retailers.

Author/year	Country	Industry	I.V	D.V	Med/mod	Theory	Method	Result
(Martínez-Falcó et al., 2024)	Spain	Wine	<ul style="list-style-type: none"> • KM • Green innovation • Collaborative culture 	SP	<ul style="list-style-type: none"> • Green innovation • Collaborative culture 	KBV	202 responses	Effective KMP are crucial for enhancing SP in the wine industry, with GI serving as a key mediator and CC as an important moderator in this relationship.
(Ismail & Supanto, 2024)	Indonesia	Manufacturing	<ul style="list-style-type: none"> • KM 	New product development	OA Business model innovation	KBV	201 responses	Results highlight the importance of integrating KMP with OA and innovative business models to enhance new product development performance.



2.5.1 KM Process, Sustainable Performance and Organisational Agility

The literature reviewed in this section provides a comprehensive examination of the relationship between KMP, SP, and OA across different sectors and contexts. Several studies have explored the effects of KMP on both SP and OA, with varying results based on industry, geographic region, and the specific components of KMP examined. For instance, in the manufacturing sector in Jordan, the study conducted by Almahamid et al. (2010) examined the influence of knowledge sharing (KS) and OA on competitive advantage. Their findings revealed that KS, a key component of KMP, positively influenced competitive advantage through its enhancement of OA. Similarly, Liu et al. (2014) investigated exploration and exploitation KMP in China's manufacturing, finance, and IT sectors. They found that these KMP contributed to operational adjustment agility and market capitalising agility, which mediated their impact on firm performance. This study highlights the critical role of agility in translating KMP into improved performance outcomes.

However, not all studies show a positive impact of KMP on agility. For example, Keshavarz et al. (2015), in their study of the automotive industry in Iran, found that while certain elements of KMP (such as senior management perspective, education and learning, and document repository) positively affected OA, knowledge sharing culture and IT use had no significant effect on agility. This highlights the potential variation in the impact of KMP on agility across industries and contexts, suggesting that certain KMP may be more effective in specific sectors.

Cegarra-Navarro et al. (2016) focused on large companies in Spain and found that the KAQ process positively affected knowledge creation and organisation (KCO), which in

turn influenced knowledge application (KAP). The KAP process was shown to enhance both OA and firm performance, with agility acting as a mediator. This study emphasises the importance of the entire KMP such as acquisition, creation, organisation, and application in driving agility and performance in large firms.

Further confirmation of the positive relationship between KMP and OA comes from Mehdibeigi et al. (2016) in Iran's banking sector, where customer-oriented KMP was found to positively affect both organisational effectiveness and agility. Agility also mediated the effect of KMP on organisational effectiveness, reinforcing the idea that KM can enhance organisational adaptability and responsiveness, which ultimately improves effectiveness. In the context of SMEs in Iran, Khazaei Pool et al. (2017) showed that organisational culture affected knowledge sharing, which in turn influenced both OA and performance. Their findings underscore the mediating role of agility in the relationship between knowledge sharing and performance, suggesting that a strong KM culture can lead to more agile and high-performing organisations. This was further supported by Tooranloo and Saghafi (2018), who demonstrated that KM positively affects OA in the manufacturing sector in Iran, contributing to greater market flexibility, competence, and responsiveness.

Similarly, Patil et al. (2016) found in Indonesia's public listed companies that KM, along with TI, positively influenced dynamic capabilities and OA, which in turn enhanced sustainable competitive advantage. This demonstrates that KMP and TI work in tandem to improve OA, ultimately contributing to long-term sustainability and competitive positioning. In the banking and insurance sectors in India, Panda and Rath (2018) explored the impact of KM and IT capabilities on business process agility and

market response agility. Their findings revealed a significant positive effect of KM on agility, further validating the role of KM in enhancing an organisation's ability to respond to market changes and maintain agility in dynamic environments.

Moreover, Gyemang and Emeagwali (2020) examined the telecommunication industry in Nigeria, finding that KMP, along with dynamic capabilities and innovation, positively influenced OA and competitive performance. This study highlights the interaction between KM, dynamic capabilities, and innovation in driving agility and performance, particularly in industries that rely heavily on technological advancements. In the pharmaceutical and clean material industries in Jordan, Al-Omoush et al. (2020) found that collaborative KC positively influenced e-business proactiveness and OA, with collaborative KC acting as a mediator. This suggests that collaboration in KMP is essential for enhancing both agility and e-business outcomes, particularly in innovation-driven industries.

A few studies have also explored the relationship between KMP, SP, and OA. For instance, Shahzad et al. (2020) investigated the impact of KMP on green innovation and SP in Pakistan's manufacturing sector. They found that KM enhanced green innovation, which subsequently improved SP. While OA also affected green innovation, it did not moderate the effect of green innovation on SP. This study highlights the complex interactions between KM, innovation, and sustainability, suggesting that KM can foster innovation that leads to improved sustainability outcomes, even if OA does not always play a direct moderating role. Another relevant study by Marjerison et al. (2022) in several Chinese industries found that KS positively affected both SP and OA, with agility mediating the relationship between KS and SP. This reinforces the idea that KM,

particularly through knowledge sharing, can drive both sustainability and agility, with agility serving as a key mechanism for translating KM into sustainable outcomes.

While the majority of studies examined in this review focus on the relationship between KMP and OA, relatively fewer have explored the direct link between KMP and SP. However, the studies that do include SP (such as Shahzad et al., 2020, and Marjerison et al., 2022) suggest that KM can contribute to sustainability through its influence on innovation and agility. Overall, the literature points to a positive relationship between KMP and OA, with mixed findings regarding the mediating role of SP. Moreover, the research is predominantly conducted in the manufacturing sector, with limited exploration of other industries, such as HE, where these relationships may manifest differently.

2.5.2 Technological Innovation, Sustainable Performance and Organisational Agility

TI and its relationship with SP and OA have been extensively studied across various industries. These studies generally suggest that the use of technology can have a positive impact on both SP and OA, although the findings are nuanced, with some variations based on industry, organisational context, and other moderating factors. For instance, in the manufacturing sector in the United States, Zelbst et al. (2011) examined the use of RFID technology and found that it positively influenced OA. RFID technology, which enables real-time data collection and improves logistics, led to better operational performance when mediated by OA. This study highlights how TI can facilitate agility by allowing organisations to adapt quickly to environmental changes, improve efficiency, and enhance their overall competitiveness. Similarly, Felipe et al. (2017), in

their study of large Spanish companies, found that the intensity of technology use had a significant impact on OA, demonstrating that organisations with higher levels of technological engagement are more adaptable and flexible. This reinforces the idea that the adoption of TI is critical for organisations to remain agile in the face of rapid technological and market changes.

Ravichandran (2018) further supports this notion, showing that IT capabilities and IT investment orientation positively influence digital platform capabilities, which in turn enhance OA. The ability of an organisation to leverage its digital infrastructure is crucial for improving its agility, allowing it to respond quickly to emerging challenges and opportunities. Similarly, Liao et al. (2019) found that inbound open innovation significantly influences business model innovation and agility in Chinese firms. Inbound innovation, which involves integrating external knowledge and technologies into the organisation, fosters adaptability and responsiveness, enabling firms to innovate their business models and remain competitive in dynamic environments. In a similar vein, Felipe et al. (2020) demonstrated that IT capability has a significant positive effect on both OA and firm performance in large Spanish organisations. This finding highlights the importance of technological resources in driving not only agility but also overall business success, particularly in industries where technology plays a critical role in maintaining competitiveness.

However, while many studies have found positive relationships between TI, SP, and OA, there are also cases where the findings are more mixed. Keshavarz et al. (2015), for example, in their study of the Iranian automotive industry, found that the use of IT did not significantly impact OA. This suggests that contextual factors such as

organisational culture, leadership, or the specific type of technology used may influence the effectiveness of TI in enhancing agility. Similarly, Patil et al. (2016) reported that in Indonesian public listed companies, TI did not directly affect sustainable competitive advantage. These findings indicate that while technology is an important enabler of agility and sustainability, it may not always produce the desired outcomes unless other supporting factors are in place.

The role of innovation capabilities in achieving SP is emphasised in various studies. Sarfraz et al. (2022), for instance, found that innovation capability, particularly green process and product innovation, has a positive effect on SP in the manufacturing sector in Pakistan. This underscores the importance of TI not only for improving business performance but also for promoting environmental sustainability. Additionally, Khan et al. (2021) proposed that green innovation influences SP, with the effect being moderated by ISO IT management. This indicates that technological standards and certifications play a critical role in shaping the sustainability outcomes of innovation.

In the context of HE, the impact of green IT and digital transformation on sustainability and agility is well-documented. Alipour et al. (2019) found that the acceptance of green IT had a positive impact on the sustainable development of universities in Iran, particularly in terms of environmental sustainability. Similarly, Ufua et al. (2021) found that digital transformation is essential for achieving the sustainable development goals of education and industrialisation in Nigeria. This highlights the importance of TI in institutional settings, where digital tools can significantly enhance both sustainability and agility. Furthermore, Jones and Wynn (2021) argue that digital transformation can

contribute to the sustainable development of organisations, reinforcing the view that adopting digital technologies is crucial for long-term sustainability.

Although the majority of studies point to a positive relationship between TI, SP, and OA, some research has shown inconsistencies. For instance, Liao et al. (2019) found that while inbound innovation positively affected business model innovation and agility, outbound innovation did not have the same impact. This suggests that the type of innovation and the way it is integrated into the organisation can significantly influence outcomes. Similarly, Keshavarz et al. (2015) reported that the use of IT did not affect OA, further emphasising the need to consider organisational context and other moderating factors when assessing the impact of TI.

Many studies also highlight the mediating role of OA in the relationship between TI and SP. For example, Marjerison et al. (2022) found that knowledge sharing affects both OA and SP, with OA mediating the relationship between knowledge sharing and SP. This suggests that while TI and KMP contribute to SP, it is OA that allows these innovations to be effectively translated into sustainable outcomes. Similarly, Rafi et al. (2022) found that KM infrastructure and capabilities influenced both OA and business performance, with OA acting as a mediator between KM and performance outcomes. This reinforces the view that agility is not only an outcome of TI but also a critical enabler of SP.

In summary, the literature generally indicates that TI has a positive impact on both SP and OA, although the effects are often mediated by OA and influenced by various contextual factors. Studies such as those by Zelbst et al. (2011), Felipe et al. (2017), and Ravichandran (2018) provide strong evidence that technology can enhance agility and

performance, while others like Keshavarz et al. (2015) and Patil et al. (2016) demonstrate that these relationships are complex and context dependent. Furthermore, the role of OA as a mediator between innovation and sustainability, as highlighted by Marjerison et al. (2022) and Rafi et al. (2022), suggests that agility is not only a desirable outcome of TI but also a key factor in ensuring that innovation leads to SP. Therefore, the integration of TI, KM, and OA is essential for achieving long-term sustainability in both corporate and educational sectors.

2.6 Gap analysis

The review of recent studies highlights several significant gaps in the literature concerning the impact of TI, KMP, SP, and OA. Addressing these gaps is critical to understanding how organisations, particularly in the public HE sector in developing nations, can leverage these factors to enhance their performance and agility. A primary gap in the literature is the geographic focus of prior studies. Most research on TI, KMP, and their impact on SP and OA has been concentrated in developed nations or emerging economies. For instance, studies conducted in the US (Jones & Wynn, 2021; Ravichandran, 2018; Zelbst et al., 2011) and Spain (Felipe et al., 2020; Cegarra-Navarro et al., 2016) have extensively explored these topics. Additionally, research from emerging economies such as China (Liu et al., 2014; Marjerison et al., 2022) also contributes to the understanding of these dynamics.

However, research conducted in developing nations remains limited. While some studies have been conducted in Iran (Alipour et al., 2019; Keshavarz et al., 2015; Khazaei Pool et al., 2017; Mehdibeigi et al., 2016), studies from other developing regions, particularly the Middle East, are scarce. Recent reviews, such as Mrugalska

and Ahmed (2021), which examined 381 studies between 2010 and 2020, concluded that most research on OA and TI has focused on developed and emerging economies, leaving a gap in the understanding of these dynamics in developing countries. Therefore, this study aims to address this geographic gap by focusing on the UAE, a developing nation in the Middle East, particularly within public HEI. By doing so, this study contributes to the broader understanding of how TI and KMP operate in developing nations.

Another gap relates to the industry focus of previous studies. The majority of the existing research on TI, KMP, and their impact on SP and OA has been concentrated in the manufacturing sector (Sarfranz et al., 2022; Shahzad et al., 2020; Tooranloo & Saghafi, 2018; Zelbst et al., 2011). Similarly, several studies have focused on large-scale private sector companies (Al-Omouh et al., 2020; Felipe et al., 2017; Jones & Wynn, 2021), SMEs (Gerald et al., 2020; Khazaei Pool et al., 2017), and the banking sector (Mehdibeigi et al., 2016; Panda & Rath, 2018).

Public sector organisations, particularly HEI, have received far less attention. Only two recent studies (Iqbal & Piwovar-Sulej, 2022; Alipour et al., 2019) have examined SP and OA at the organisational level in HEI. Given the increasing pressures on HEI to adapt to technological advancements and societal changes, this lack of research represents a significant gap. Therefore, this study addresses the industry-specific gap by focusing on public universities in the UAE, which have received minimal attention in the literature. By exploring these dynamics in HE, this study contributes to a better understanding of how public institutions, particularly universities, can enhance their SP and agility.

A further gap pertains to the specific variables of TI, KMP, SP, and OA. While these variables have been studied independently in various contexts, few studies have investigated their combined effects on SP and OA, especially in developing countries. Ode and Ayavoo (2020) also pointed out this gap, emphasising that the role of KMP and TI in developing nations has been underexplored. Moreover, recent studies show mixed findings on the impact of KMP and TI on SP and OA (Keshavarz et al., 2015; Patil et al., 2016).

In addition, limited research has been conducted on SP at the organisational level, with calls for further research on the impact of IT on SP (Kamel, 2021). This gap is particularly critical in developing nations where the role of technology in enhancing sustainability needs to be better understood. Therefore, this study seeks to address this variable-specific gap by examining the combined effects of TI and KMP on SP and OA in public universities in the UAE.

Another gap in the literature relates to the mediating role of SP between TI, KMP, and OA. While some recent studies, such as Marjerison et al. (2022) and Rafi et al. (2022), have explored the role of agility as a mediator in these relationships, there is a lack of empirical research that examines how SP mediates the relationship between TI and KMP with OA. By investigating the mediating role of SP, this study aims to provide a deeper understanding of how KMP and TI contribute to OA in the context of HEI in the UAE.

Theoretical frameworks have been underutilised in studies on TI, KMP, SP, and OA. Many recent studies have not deployed any explicit theoretical framework to explain

the relationships between these variables (Alipour et al., 2019; Felipe et al., 2020; Keshavarz et al., 2015; Khazaei Pool et al., 2017). This limits the ability of these studies to generalise their findings and contribute to broader theoretical discussions. To address this theoretical gap, this study applies two established frameworks: the RBV and the KBV. The RBV highlights the importance of leveraging organisational resources, such as technological capabilities, to achieve competitive advantage and performance improvements, while the KBV emphasises the role of knowledge as a critical strategic resource that can enhance both SP and OA. By integrating these theoretical perspectives, this study provides a comprehensive framework to explain how TI and KMP interact to influence SP and OA in public universities.

There is also an empirical gap in the existing literature, as much of the recent research has been either conceptual or based on literature reviews (Jones & Wynn, 2021; Khan et al., 2021; Mrugalska & Ahmed, 2021; Saha et al., 2020). These studies provide valuable insights into the state of research on SP, OA, and TI, but there is a need for empirical studies that test these relationships in practical, real-world contexts. This study addresses this empirical gap by conducting an empirical investigation of the impact of TI and KMP on SP and OA in public HEI in the UAE. By collecting and analysing primary data, this study provides concrete evidence of how these variables interact in practice, contributing to the empirical literature and offering insights that can inform both theory and practice in organisational management and sustainability.

Overall, this study seeks to address several significant gaps in the literature, including geographic focus, industry-specific contexts, variable-specific relationships, the mediating role of SP, theoretical frameworks, and empirical research. By focusing on

public universities in the UAE and examining the intersections between TI, KMP, SP, and OA, this study contributes to an underexplored area. Moreover, by applying the RBV and KBV, this study provides a comprehensive theoretical framework to explain these relationships, contributing to both academic theory and practical applications in HEI and other sectors in developing nations. This study, with its focus on addressing these gaps, provides valuable contributions to the literature and offer insights that can guide policymakers, educators, and practitioners in enhancing SP and OA in public HEI.

2.7 Conceptual Framework

Drawing upon the RBV and KBV theories, as well as a comprehensive review of the literature, this study posits that TI and KMP have a positive influence on both SP and OA within public universities in the UAE. The study further hypothesizes that SP positively affects OA, suggesting that improvements in SP contribute to an institution's ability to respond agilely to dynamic environmental conditions. Additionally, SP is proposed as a mediating factor, bridging the influence of TI and KMP on OA. This implies that SP serves a crucial role in translating technological and knowledge management advancements into enhanced agility within the organisation. Figure 2.1 presents the conceptual framework, visually mapping these hypothesized relationships between TI, KMP, SP, and OA in the context of UAE public universities.

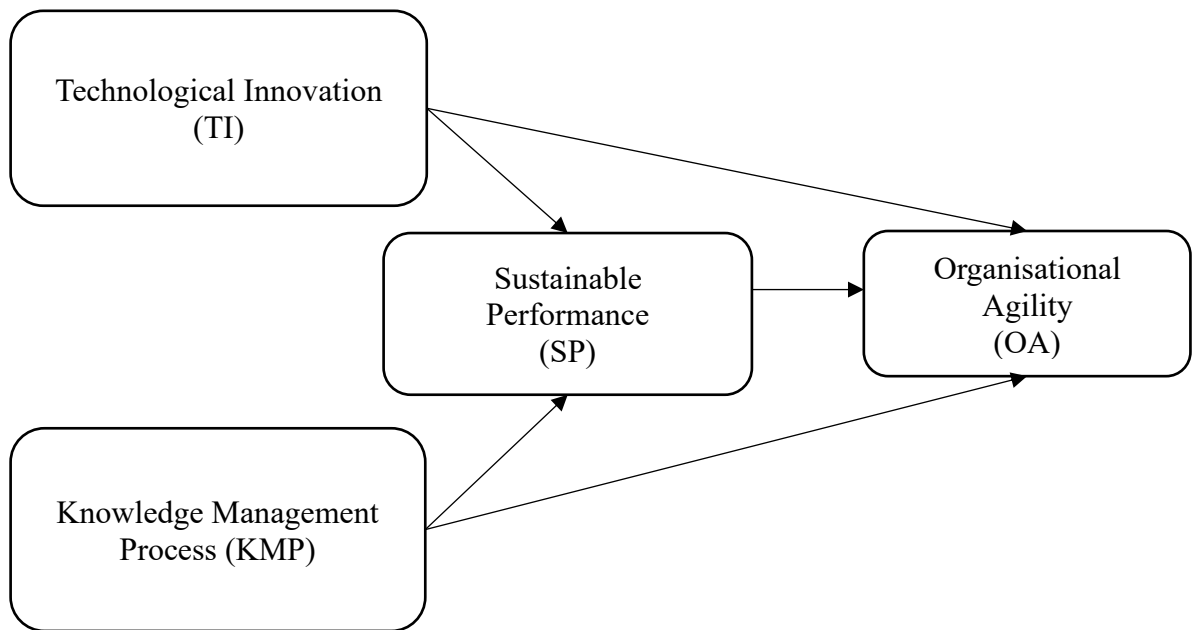


Figure 2. 1: Proposed framework

Based on the above framework and on the discussion in section 2.5.1 and section 2.5.2, the hypotheses of this study are as follows:

2.7.1 Technological Innovation and Sustainable Performance

TI is broadly defined as "the use of tools and techniques that extend human capability and are new to an organisation" (Tidd & Bessant, 2020). Numerous studies have investigated the relationship between TI and SP across various industries, consistently demonstrating the potential for TI to drive sustainability and competitive advantage. For example, Patil et al. (2016) explored the effect of TI on sustainable competitive advantage in public listed companies and found that TI positively influenced an organisation's ability to adapt and maintain a competitive edge. Similarly, Panda and Rath (2018) investigated TI capabilities in the banking and insurance sectors, finding that technological capabilities played a significant role in enhancing OA and addressing environmental factors, both of which are critical to improving SP.

Further supporting these findings, Felipe et al. (2020) found that IT capabilities had a positive effect on firm performance in large Spanish companies, with technology intensity acting as a moderator. Their study also revealed that OA mediated the relationship between IT capabilities and firm performance, highlighting the role of TI in enabling organisations to respond effectively to changing market conditions and environmental demands, thus enhancing sustainability outcomes. Mrugalska and Ahmed (2021), in their review of Industry 4.0 technologies, emphasised the pivotal role that advanced technologies, such as AI and the IoT, play in fostering OA. They argued that these technologies are key enablers of agility, which, in turn, supports SP by improving an organisation's ability to navigate complex and dynamic environments.

Similarly, Sarfraz et al. (2022) focused on innovation capabilities in green process and product innovations, showing that these forms of TI significantly contribute to SP in the manufacturing sector by addressing both environmental and operational sustainability. Moreover, Rafi et al. (2022) explored the impact of KM infrastructure and TI on OA and business performance in service organisations. Their findings revealed that TI not only enhances business performance but also strengthens OA, enabling firms to better adapt to market shifts and sustainability challenges.

Collectively, these studies suggest that TI is a key driver of SP, with its benefits extending beyond competitive advantage to include enhanced dynamic capabilities, agility, and the ability to meet environmental goals. By adopting new technologies, organisations can innovate, respond to environmental pressures, and achieve long-term sustainability. Therefore, the following is hypothesized:

H1: TI has a positive effect on SP.

2.7.2 Knowledge Management Process and Sustainable Performance

The KMP is described as a sequence of phases that involve capturing, storing, disseminating, and utilising knowledge (Chang & Lin, 2015). Despite its critical importance in organisational dynamics, the effect of KMP on SP has been explored only in a limited number of studies. However, the available literature provides compelling evidence of the positive association between KMP and various organisational outcomes, such as firm performance, OA, and competitive advantage, which indirectly point to its potential impact on SP.

For example, Cegarra-Navarro et al. (2016), in Spain, explored the relationship between KMP and firm performance. Their findings revealed a strong connection between these processes and overall firm performance, mediated by OA. This suggests that organisations proficient in managing knowledge processes can improve not only their operational performance but also their capacity to adapt to changes, which ultimately contributes to long-term sustainability. Mehdibeigi et al. (2016), in their study of the banking sector in Iran, found that customer-focused KMP had a positive effect on both organisational effectiveness and agility, further demonstrating the importance of effective KM in enhancing an organisation's ability to achieve its goals. OA, in turn, mediates the relationship between KMP and organisational effectiveness, highlighting the potential indirect impact on SP.

Khazaei Pool et al. (2017) explored the relationship between organisational culture, knowledge sharing, and performance in small and medium-sized enterprises in Iran.

They found that knowledge sharing positively influenced both OA and performance, with OA mediating the effect of knowledge sharing on performance. This indicates that fostering a knowledge-sharing culture can enhance an organisation's adaptability and overall performance, both of which are critical components of SP.

Moreover, Tooranloo and Saghafi (2018) provided additional evidence from the manufacturing sector in Iran, where companies that adopted KMP exhibited increased flexibility, competence, and responsiveness, thus enhancing their OA. This agility enabled them to remain competitive and sustainable in a dynamic market environment. Similarly, Rafi et al. (2022) found that KMP positively affected business performance and that OA mediated the relationship between KMP and business performance in service organisations in Pakistan. These findings align with the growing body of literature that underscores the crucial role of agility as a mediating factor between KMP and various organisational outcomes, including SP.

Other studies have also pointed to the broader implications of KMP on sustainability. Shahzad et al. (2020), for example, investigated the impact of KMP on corporate SP in the manufacturing sector in Pakistan. Their findings indicated that KMP positively influenced green innovation, which in turn contributed to sustainability outcomes such as environmental, economic, and social performance. Although OA did not moderate the relationship between green innovation and SP in their study, the clear connection between KMP and sustainability was evident.

Almahamid et al. (2010) further demonstrated the positive relationship between knowledge sharing, OA, and competitive advantage in the manufacturing sector in

Jordan. Knowledge sharing and agility were found to be key contributors to achieving competitive advantage, a core element of SP. In a similar vein, Gyemang and Emeagwali (2020) studied the telecommunication sector in Nigeria and found that KMP positively influenced dynamic capability, innovation, and competitive performance. OA and innovation, in turn, positively affected competitive performance, reinforcing the connection between KM, agility, and sustainability.

While these studies provide valuable insights into the effect of KMP on performance and OA, they also highlight the limited research specifically focusing on the direct relationship between KMP and SP. The potential for KMP to enhance SP through improved OA, dynamic capabilities, and competitive advantage is evident, but there remains a need for more focused research in this area.

Based on the evidence from the aforementioned studies, it is clear that KMP have a significant influence on OA, performance, and sustainability-related outcomes. Therefore, this study aims to address the gap by examining the direct relationship between KMP and SP in the context of public universities in the UAE. The positive effects of KMP on OA and performance suggest that KMP will similarly have a positive effect on SP. Given the existing literature, this study proposes the following hypothesis:

H2: KMP has a positive effect on SP.

2.7.3 Technological Innovation and Organisational Agility

The relationship between TI and OA has been investigated in a relatively limited number of studies, though the available literature highlights its significance. Several

studies demonstrate how the adoption of TI can enhance an organisation's ability to be flexible and adaptive in response to dynamic environments. Zelbst et al. (2011) examined the role of RFID technology in the manufacturing sector and found that it had a significant impact on OA. Their study revealed that the implementation of RFID technology allowed organisations to improve their operational efficiency and responsiveness to market changes, directly influencing agility. Patil et al. (2016) further supported this by showing that TI had a significant effect on OA in public listed companies. Their findings suggest that organisations with robust technological capabilities are better equipped to handle rapid changes and uncertainty, thus enhancing agility.

Ravichandran (2018) provided additional insights by demonstrating that information systems (IS) capabilities and IT investments have a positive effect on digital capabilities, which in turn positively influence OA. The study emphasised that the digital transformation enabled by IT investments plays a crucial role in improving an organisation's ability to adapt quickly to environmental changes, further reinforcing the importance of TI in driving agility. Žitkienė and Deksnys (2018) extended this understanding by proposing that dynamic capabilities, which include the organisation's ability to integrate, build, and reconfigure internal and external competencies, have a positive effect on OA. This perspective suggests that TI enhances an organisation's dynamic capabilities, which, in turn, fosters greater agility by allowing the organisation to anticipate and respond to external challenges more effectively. Panda and Rath (2018) also found that IT capabilities significantly influence both business process agility and market response agility. Their study of the banking and insurance sectors in India demonstrated that organisations with advanced IT capabilities are better positioned to

streamline business processes and respond promptly to market demands, ultimately improving their overall agility.

Additionally, Felipe et al. (2020) found that IS capabilities positively affect OA in large organisations in Spain. Their study highlighted that organisations with strong IS capabilities are more adaptable and flexible, particularly in high-tech industries. The findings further emphasised that TI, through IS capabilities, is essential for enhancing OA in dynamic and competitive environments. Collectively, these studies suggest that TI, particularly in the form of IT and IS capabilities, plays a critical role in enhancing OA. By adopting advanced technologies, organisations can increase their flexibility, responsiveness, and overall agility, enabling them to adapt quickly to environmental changes and remain competitive. Based on the findings from the literature, this study proposes the following hypothesis:

H3: TI has a positive effect on OA.

2.7.4 Knowledge Management Process and Organisational Agility

The relationship between KMP and OA has been explored in several studies, demonstrating a significant positive impact across various industries and contexts. The ability of an organisation to capture, store, share, and apply knowledge effectively is a critical factor in enhancing its adaptability and responsiveness to changing market conditions. Liu et al. (2014) highlighted the role of both exploration and exploitation KMP in fostering two critical types of OA: operational adjustment agility and market capitalising agility.

In a study of large companies in Spain, Cegarra-Navarro et al. (2016) found that KAQ and conversion processes positively impact firm performance, with OA acting as a mediator. This suggests that KMP is a core enabler of OA, making it a key strategic priority for firms aiming to remain competitive. Gyemang and Emeagwali (2020) explored the effect of KMP on OA in Nigeria's telecommunications sector. Their findings confirmed the positive association between KMP and OA, showing that effective KMP can lead to enhanced agility in service-oriented sectors as well. Further supporting these findings, Khazaei Pool et al. (2017) investigated the relationship between organisational culture, KS, and OA in SMEs in Iran and found that KS significantly enhanced both OA and performance, with OA acting as a mediator. This study highlights the role of a knowledge-sharing culture in fostering agility, suggesting that when employees and teams actively share knowledge, the organisation becomes more responsive and adaptable to environmental changes.

The study by Tooranloo and Saghafi (2018) in Iran's manufacturing sector provided additional evidence of the positive relationship between KMP and agility. They found that organisations that adopted comprehensive KMP experienced improvements in flexibility, competence, and responsiveness, which are core components of OA. Their findings suggest that KMP, by enhancing an organisation's ability to learn and adapt, contribute directly to its agility, enabling it to respond swiftly to market fluctuations and operational challenges. Additionally, Panda and Rath (2018), in their study of the banking and insurance sectors in India, examined the impact of IT and KMP on business process agility and market response agility. Their findings further emphasised that KMP are essential for enabling organisations to streamline processes and respond rapidly to market demands, highlighting the critical role of KM in enhancing overall OA.

However, not all studies have demonstrated a universally positive relationship between KMP and OA. For instance, Keshavarz et al. (2015) found that certain critical success factors of KMP, such as KS culture and the use of IT, did not have a significant effect on OA in the Iranian automotive industry. Nonetheless, the effectiveness of KMP in driving agility may be contingent upon specific organisational and industry contexts, suggesting the need for further research to identify the conditions under which KMP are most effective in enhancing OA. Based on the consistent findings in the literature, this study proposes the following hypothesis:

H4: KMP has a positive effect on OA.

2.7.5 Sustainable Performance and OA

The relationship between SP and OA has been investigated in a relatively limited number of studies. However, the existing literature highlights the critical link between these two concepts, indicating that organisations that achieve high levels of SP are often more agile and better equipped to respond to dynamic market conditions. Almahamid et al. (2010) conducted a study in Jordan's manufacturing sector, which revealed that KS and OA are key contributors to competitive advantage. While the focus of the study was primarily on KS, its findings suggest that OA is essential for maintaining a competitive edge. This indicates that agility may play a crucial role in translating sustainable practices into competitive advantages, emphasising the importance of agility in the context of sustainability.

In the context of China's manufacturing, finance, and IT sectors, Liu et al. (2014) explored the relationship between OA and firm performance, which they identified as a

critical component of SP. Their findings indicate that agility enables firms to adjust their operations and capitalise on market opportunities, leading to improved performance. This connection between agility and firm performance suggests that SP supports greater agility by providing a stable foundation for adaptation and responsiveness. Mehdibeigi et al. (2016) further demonstrated the relationship between OA and organisational effectiveness in the banking sector in Iran. Their findings suggest that organisations with higher agility are more effective in achieving their goals, and this effectiveness can, in turn, contribute to SP. By enabling organisations to respond more quickly to environmental changes and market demands, agility enhances their ability to meet sustainability targets, reinforcing the bidirectional relationship between SP and agility.

Patil et al. (2016) found a direct association between SP and OA, particularly in the context of dynamic capabilities. Their study in Indonesia's public listed companies suggested that organisations with high levels of SP were better able to achieve OA. This finding highlights that sustainability-oriented organisations often possess the flexibility and responsiveness needed to navigate complex and uncertain environments. SP, which promotes efficiency and resilience, can thus enhance an organisation's ability to adapt and innovate in response to external pressures.

Cegarra-Navarro et al. (2016) also supported this view in their study of large companies in Spain. They found that KAQ and KAP, both of which contribute to SP, positively impacted firm performance through the mediation of OA. This indicates that SP not only directly influences firm success but also indirectly supports agility, suggesting that sustainability practices enhance an organisation's adaptability and responsiveness to change. Additionally, Gyemang and Emeagwali (2020), in their study of Nigeria's

telecommunication sector, found that KMP, which are integral to SP, positively influenced OA. Their study emphasised that sustainability practices improve organisational capabilities to adapt swiftly to technological advancements and market changes.

Furthermore, Rafi et al. (2022) in their study of service organisations in Pakistan, found that KMP and SP positively affected OA. Their findings emphasise the symbiotic relationship between SP and agility, where higher levels of SP lead to more agile organisations capable of responding to market changes and sustaining long-term success. The importance of this relationship is reinforced by Shahzad et al. (2020), who examined the impact of green innovation on corporate sustainability performance and OA in Pakistan's manufacturing sector. They found that green innovation significantly influenced agility. This demonstrates that sustainability-oriented innovations contribute to a firm's ability to adapt to external challenges and opportunities, further reinforcing the link between SP and agility.

Collectively, these studies suggest that SP, through its focus on long-term operational, environmental, and social objectives, enables organisations to remain agile in dynamic environments. High levels of SP provide a stable platform for organisations to adapt, innovate, and respond quickly to external changes, ultimately enhancing their agility. Given these insights, SP is not only a desired outcome but also a critical enabler of OA. Based on these findings, this study proposes the following hypothesis:

H5: Sustainable performance has a positive effect on organisational agility.

2.7.6 Mediating Role of Sustainable Performance

The relationship between SP, TI, KMP, and OA is complex and interconnected. Through the strategic use of knowledge, organisations can enhance their SP by achieving goals such as reducing resource consumption, minimising environmental impact, and improving social and employee well-being (Okřęglicka, 2023). This enhanced SP, in turn, contributes to improved OA, as organisations that excel in sustainability are better equipped to adapt to evolving market conditions and regulatory demands (A. N. Khan, 2023).

KMP serve as a foundation for the implementation of sustainability strategies, which enhances an organisation's overall agility. The effective application of KMP allows organisations to integrate sustainable practices into their daily operations, thereby fostering agility by facilitating swift adaptation to changing environmental and social demands. For instance, Shahzad et al. (2020) demonstrated that green innovation moderated the effect of KMP on corporate SP in the manufacturing sector. This finding suggests that KMP plays a crucial role in driving SP, which in turn enhances OA by enabling firms to remain competitive and responsive in dynamic environments.

In the context of TI, advancements in green technologies and sustainable innovations have been shown to significantly improve sustainability outcomes, which also enhances OA. TI that supports sustainability objectives, such as green IT or eco-friendly technologies, enables organisations to not only reduce their environmental footprint but also increase their responsiveness to market shifts and regulatory changes. For instance, Alipour et al. (2019) explored the moderating role of green IT acceptance in the relationship between green university practices and sustainable development in the

environment. Their findings indicate that the adoption of green technologies directly contributes to SP, thus enabling organisations to be more agile in their approach to sustainability goals.

Moreover, Panda and Rath (2018) examined how environmental factors moderated the relationship between IT and KMP with business process agility and market response agility. This study reinforces the idea that TI, when aligned with sustainability practices, can enhance OA by enabling firms to streamline operations and respond effectively to market and environmental demands. This aligns with the broader argument that TI aimed at sustainability not only contribute to better environmental and social outcomes but also improve OA by enhancing the organisation's ability to implement and adapt to sustainability-driven changes.

Despite the limited number of studies investigating the mediating role of SP in the relationship between technological innovation, KMP, and OA, there is a growing recognition that SP plays a critical role in shaping agility. The integration of sustainability into core business processes, driven by both KM and TI, creates a dynamic environment where organisations can quickly adapt to external pressures while maintaining competitive advantage. Gyemang and Emeagwali (2020) further support this argument by showing that KMP positively influence both OA and SP in the telecommunications sector. This suggests that organisations that manage their knowledge effectively are more likely to achieve better sustainability outcomes, which in turn enhances their agility. Likewise, Cegarra-Navarro et al. (2016) found that knowledge acquisition and application processes contributed to firm performance

through the mediation of OA, reinforcing the idea that SP enhances organisational flexibility and adaptability.

In line with these findings, Shahzad et al. (2020) demonstrated that KMP positively affected green innovation, which subsequently impacted SP. This highlights the interconnectedness of KMP, sustainability, and agility. Organisations that manage their knowledge well can drive innovation that not only improves sustainability outcomes but also enhances their ability to respond to market changes, regulatory demands, and environmental challenges.

Given the evidence, SP acts as a mediator between TI and OA as well as between KMP and OA. As organisations implement sustainability-driven TI and KMP, they become more agile in adapting to external challenges and leveraging new opportunities. SP serves as the bridge that links technological and knowledge-based advancements with greater organisational flexibility and adaptability. Based on this evidence, the following hypotheses are proposed:

H6: SP mediates the effect of TI on OA.

H7: SP mediates the effect of KMP on OA.

2.8 Summary

This chapter offers an in-depth review of the literature on OA, SP, TI, and KMP. It provides a detailed overview of these key constructs, delving into their theoretical foundations and exploring their significance in organisational studies. The chapter discusses the RBV and KBV as theoretical frameworks, which help explain the intricate relationships between these variables. By examining these theories, the chapter

highlights how organisations can leverage their resources and knowledge to enhance agility and sustainability. The review extends into a detailed exploration of OA and SP, synthesising existing literature to examine their interconnectedness with TI and KMP. This examination not only consolidates prior findings but also identifies key research gaps, which are essential for understanding the unique contributions of this study to the broader academic field. The identification of these gaps serves as a foundation for further investigation, positioning this study to address areas that remain underexplored in the current literature.

Moreover, the chapter introduces the conceptual framework underpinning the research. This framework is meticulously developed, drawing on both the RBV and KBV, and provides a solid foundation for the formulation of hypotheses. These hypotheses will be empirically tested in subsequent chapters, building on the theoretical insights established in this chapter. The framework offers a structured approach for investigating the relationships between OA, SP, TI, and KMP within the specific context of this study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter introduces the methodological framework used to address the research questions and achieve the study's objectives. The chapter is divided into nine sections, each providing a unique perspective on the research methodology used. The initial section of the study provides an explanation of the selected research design and its alignment with the study's objectives and research questions. This section provides a detailed explanation of the research process, including a step-by-step approach and an overview of how each phase contributes to the overall coherence of the research. The unit of analysis section provides clarity on the specific entities that are the focus of the study. The fourth section focuses on the essential elements of sampling. This chapter provides an in-depth analysis of the procedures, techniques, and rationale used to select study participants. The fifth section offers the research instruments used, including their development in the research context. The sixth section examines the procedures used to validate and ensure the reliability of the research instruments. This data collection procedure provides a detailed explanation of the procedures and methodologies used to collect primary data, establishing the empirical basis of the research. Section eight provides an overview of the strategies and techniques used for data analysis. The final section provides a brief overview of the main points discussed in the chapter.

3.2 Research Design

Figure 3.1 illustrates the research design by breaking down its various layers. Figure 3.1 depicts the research design, inspired by the framework proposed by Saunders et al. (2007; 2019). This complex design is an essential tool that illuminates crucial elements that collectively influence the research process. This section provides an overview of the research paradigm, approach, the nature of the study, and the key instrument used for data collection. The research paradigm is central to this design as it defines the researcher's worldview and philosophical stance. This layer highlights the selection of paradigms, including positivist, interpretivist, critical, or pragmatic. The researcher's perspective and the research process are significantly influenced by this foundational aspect.

The research approach refers to the strategic orientation chosen to investigate the research questions, building upon the chosen paradigm. Methodologies used in research include deductive and inductive reasoning, quantitative and qualitative methods, or a combination of both. The selected approach determines the path of data collection and analysis. This section examines the fundamental nature of the study, determining whether it is exploratory, explanatory, descriptive, or causal. This aspect clarifies the main objective of the study and its focus on identifying patterns, associations, or phenomena. The outer layer of the onion represents the instrumental aspect of data collection. This essential component delineates the methodologies and instruments utilised for collecting empirical data. Data collection methods in research is a survey. Figure 3.1 functions as a helpful visual aid, providing a clear and structured overview of the research design process.

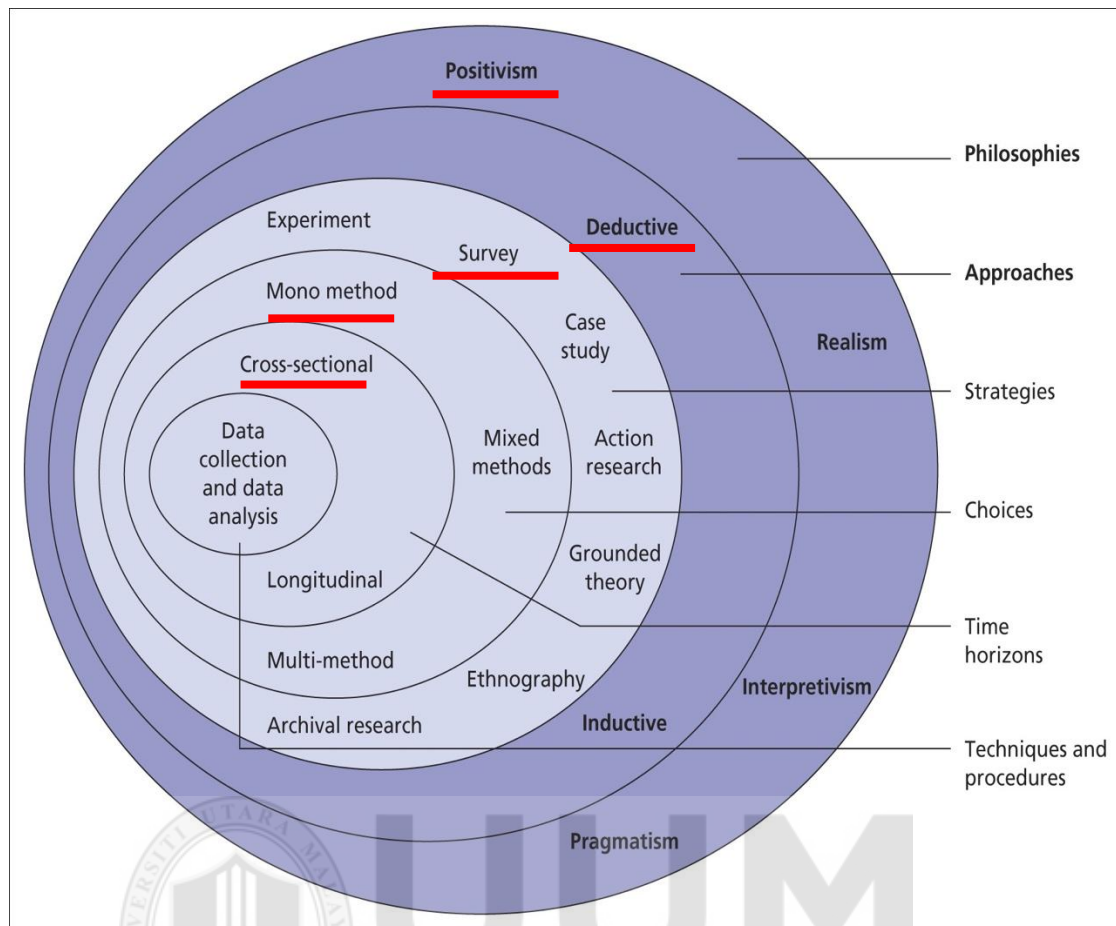


Figure 3. 1: Onion Model of the Research Design
Source: Saunders et al. (2019).

3.2.1 Research Philosophy

The literature in social science frequently discusses two primary paradigms: positivism and constructionism. Positivism is defined as “objectivist, experimentalist, traditionalist and a paradigm that uses quantitative method to understand the phenomena while constructionism essentially employs a qualitative method to understand and interpret the phenomena” (Collis & Hussey, 2013; Creswell, 2007). This study deploys the positivist paradigm. The use of this paradigm is justified due to the fact that this study is objective, uses a quantitative approach, and the researcher is independent. These characteristics fit into a positivism paradigm as suggested by Saunders et al. (2007).

In addition to the deductive approach, which guides this study by drawing on established theories like the RBV and KBV, positivism encompasses several core principles that shape the research design and methodology. The deductive framework applied in this research aligns with the broader positivist philosophy, ensuring that all key criteria of positivism are adhered to throughout the research process. Table 3.1 offers a clear summary of these criteria, as articulated by Saunders et al. (2015), illustrating how positivism manifests in various aspects of research.

The ontology of positivism, as shown in the table, is rooted in the belief that reality is real, external, and independent of human perceptions. This means that the constructs being studied—such as OA, SP, TI, and KMP—are treated as objective phenomena that exist outside the researcher's influence. These phenomena are viewed as part of an ordered reality that can be understood and explained through empirical investigation. The epistemology of positivism aligns with this view by emphasising the scientific method, where knowledge is gained through observation and measurement of observable and quantifiable facts. In this study, the objective is to make generalisations based on the relationships between the variables, providing causal explanations and predictive insights, which is a hallmark of positivist research.

The axiology in positivism, as described in Table 3.1, reflects the value-free nature of research, where the researcher maintains a neutral and objective stance. In this study, the researcher remains separated from the subject matter, avoiding biases that could distort the findings. This approach ensures that the research outcomes are driven solely by the data and not by personal values or opinions. Finally, the methodology employed in positivist research typically involves a deductive, structured approach with large

sample sizes, quantitative measurement, and statistical analysis. This study, by employing a deductive framework based on the RBV and KBV, adheres to these methodological guidelines. The use of structured quantitative methods ensures that the research follows a logical, systematic process, enhancing the validity and reliability of the findings.

Thus, by integrating these positivist criteria, the study ensures a rigorous approach to examining the relationships between the variables. The emphasis on objectivity, measurement, and generalisability strengthens the research's contribution to both theory and practice, providing a robust foundation for exploring how TI and KMP influence OA and SP.

Table 3.1: Criteria of Positivism

Ontology	Epistemology	Axiology	Typical method
Real, external, independent Reality (universalism) Ordered	Scientific method Observable & measurable facts Generalisations Causal explanation & prediction as contribution	Value free research Researcher is separated, neutral, cannot be biased Research maintains objective stance	Deductive, structured, huge sample size, measurement, quantitative approach

Source: (Saunders et al., 2015)

3.2.2 Research Approach

Two primary research methodologies commonly used in the investigative process are deductive and inductive reasoning, as described by Sekaran and Bougie (2019). These different approaches establish the foundation for formulating research questions, collecting data, and interpreting findings. The deductive approach involves the researcher starting with a clearly defined theoretical framework or a set of hypotheses. The objective is to empirically evaluate these pre-existing theories or hypotheses. Deductive reasoning employs a top-down approach, starting with a broad theory or

hypothesis and moving toward specific observations and conclusions. This method is appropriate for verifying or confirming existing knowledge, which aligns with the objectives of this research.

On the other hand, the inductive approach follows a distinct path. The process starts by collecting specific observations or data points and then aims to derive generalised theories or hypotheses based on these empirical findings. Inductive reasoning utilises a bottom-up approach, wherein patterns or themes are derived from the data, enabling the development of novel theoretical insights. This approach is commonly used to generate new theories or concepts, emphasising exploration and innovation. This study aims to examine the effects of TI and KMP on SP and OA in public universities in the UAE. To achieve this objective, a deductive approach is chosen. This decision is consistent with the study's objective to assess and confirm established theories and hypotheses concerning the specified variables. The research aims to use deductive reasoning to gather empirical evidence that confirms existing theories, thereby enhancing the existing knowledge in this field.

The deductive research approach was deliberately chosen for this study to rigorously examine and validate existing theories and hypotheses related to TI, KMP, SP, and OA in the specific context of public universities in the UAE. This methodological approach ensures that the research is organised, driven by hypotheses, and capable of generating valuable insights with practical implications.

3.2.3 Research Strategy

Different research methodologies can be used to collect data and derive significant insights. The survey method is a relevant strategy for the current study. This research focuses on hypothesis testing to examine and confirm causal associations between constructs. It draws on established theories like the KBV and RBV. To collect data, a quantitative research design using a structured questionnaire survey is the most appropriate strategy (Sekaran & Bougie, 2019; Zikmund et al., 2013). The survey method is a systematic approach to gathering primary data by directly communicating with a representative sample of individuals (Zikmund et al., 2013). The research process involves distributing well-designed questionnaires to participants in order to collect targeted data relevant to the research goals. This methodology is suitable for this study because it can effectively collect data from a wide range of participants, enabling the empirical investigation of the proposed causal associations.

The survey method, known for its systematic and quantifiable approach, is well-suited to provide the necessary empirical foundation for rigorous hypothesis testing. This study allows for an examination of the theoretical foundations, specifically KBV and RBV, and the verification of the proposed associations between the main concepts. This strategy aims to generate precise and actionable insights, thereby contributing to the existing knowledge in the field.

This study is quantitative, and it uses a survey design. There are several reasons that support the use of the survey. First, this method allows researchers to evaluate a set of variables in a single study. In comparison with other strategies of collecting data such as interviews and observations, the survey is considered preferable for generalizing the

findings and describing the trend of finding the association among the variables (Saunders & Tosey, 2012). Moreover, the majority of prior literature that have investigated the SP or OA have deployed a survey approach to collect the data due to cost-effectiveness, convenient, and time of the studies (Gerald et al., 2020; Iqbal & Piwowar-Sulej, 2022; Marjerison et al., 2022; Rafi et al., 2022).

3.2.4 Methodological Choice

In research, different categories are used as frameworks to define the overall purpose and scope of a study. Saunders and Tosey (2012) identified three categories of research: exploratory, descriptive, and explanatory. Each category is designed to achieve specific objectives and employs distinct methodologies. Exploratory research is distinguished by its focus on investigating relatively unexplored areas. Exploratory studies are commonly undertaken in situations where there is a dearth of prior knowledge or comprehension regarding a specific phenomenon. In such instances, data collection methods such as interviews and observations are commonly utilised. Exploratory research seeks to discover novel insights, generate hypotheses, or identify trends and patterns that can later inform more targeted research endeavours.

Descriptive research aims to provide a comprehensive depiction of a specific subject or phenomenon. The focus of this study is to describe the characteristics of variables and analyse their associations. Descriptive studies aim to address inquiries pertaining to "what" and typically entail the gathering and examination of demographic information. This "research methodology" facilitates the creation of a comprehensive depiction of a given situation, thereby enhancing its significance in comprehending the existing situation.

Explanatory research, also referred to as causal research, explores the underlying reasons or causes behind a phenomenon, moving beyond mere description to understand the factors contributing to it. The objective is to elucidate the fundamental causes or factors contributing to a specific phenomenon. Explanatory research aims to establish causal associations and offer explanations for observed patterns or outcomes. This approach is valuable for comprehending causality and the interconnectedness of variables.

This study aims to comprehensively understand SP and OA in public universities in the UAE. It falls under the explanatory research category. Explanatory research, according to Sekaran and Bougie (2019), aims to understand and clarify the underlying causes of specific phenomena. The study aims to examine the effects of TI and KMP on SP and OA. The research aims to establish causal associations and provide insights into the underlying mechanisms driving SP and OA in educational institutions through an explanatory approach. The primary objective of this study is to investigate the factors that influence SP and OA, with a particular focus on understanding the underlying reasons and mechanisms behind these influences. The study aims to provide valuable insights into the dynamics of SP and OA in public universities in the UAE.

3.2.5 Time Horizons

The selection of time horizon is a crucial factor in determining the methodology and data collection approach in research. There are two main time horizons: cross-sectional and longitudinal. Each has unique characteristics and implications (Saunders & Tosey, 2012). Cross-sectional research refers to the collection of data at a specific moment, providing a snapshot of the phenomenon or variables being studied. This approach

involves collecting data from a diverse group of respondents or subjects at the same time, allowing for a snapshot of the population or sample at a specific moment. Cross-sectional studies are well-suited for examining the current conditions, characteristics, or associations among variables at a specific moment in time.

Longitudinal research involves collecting data at multiple time points to observe changes, developments, or trends over an extended period. This method entails collecting data on multiple occasions, usually with a time gap in between. Longitudinal studies are valuable for analysing the evolution of variables, establishing causality over time, and assessing the effects of interventions or changes across various time periods. The time horizon chosen for this study is consistent with the cross-sectional approach. The decision is mainly influenced by the requirement for a shorter data collection period and the use of a structured questionnaire as the data collection instrument (Sekaran & Bougie, 2019). Cross-sectional research is an effective method for collecting data from a diverse group of participants in a short period of time. Additionally, the use of questionnaires allows researchers to collect data at a specific moment, providing a comprehensive overview of the variables associated with SP and OA in public universities in the UAE.

3.3 Research Process

This study is conducted in six distinct phases, each playing a crucial role in the research process. These phases contribute to the systematic advancement of knowledge and guide the study towards achieving its defined objectives. The study begins with the initial phase, known as the preliminary study. During the initial phase, the research problem and its related issues are accurately identified. The introduction establishes the

foundation of the study by outlining the research questions and objectives, which guide the subsequent phases. The second phase of the study involves conducting a literature review, which involves critically examining existing knowledge. The research conducts a thorough literature review, serving various purposes. The study not only supports the identified research problem but also highlights the gaps, issues, and complexities within the field. In this study, a thorough analysis of 35 relevant articles on SP and OA is performed.

The third phase involves developing a strong conceptual framework, building on insights from the literature review and informed by related theories. This framework provides the conceptual structure for the study. It encompasses the interactions between variables, associations, and constructs that are relevant to the research problem. In this phase, hypotheses are carefully formulated to establish a structured foundation for hypothesis testing. The “research methodology”, as the fourth phase, plays a crucial role in implementing the research design and collecting data. During this phase, important decisions are made, such as choosing the research design, identifying the target population, selecting a suitable sample, and designing the data collection instrument. The chosen data collection instrument for this study is a structured questionnaire. Stringent measures are implemented to ascertain the validity of the process, which include expert validation and piloting to ensure reliability. Following this, the phase of collecting field data is carried out.

The fifth stage of the research process, known as data analysis, is where the research findings are synthesised and validated. It requires a comprehensive analytical approach. The initial examination of data involves the use of “Statistical Package for the Social

Sciences” (SPSS) to address various preliminary factors, including missing data, outliers, normality, multicollinearity, and non-response bias. The study employs “Structural Equation Modelling-Partial Least Square (SEM-PLS)” to rigorously test the hypotheses of the conceptual framework. SEM-PLS is a reliable approach for evaluating intricate associations among variables.

In the last stage, experts were engaged to validate the research model. Their evaluation involved assessing the clarity, relevance, and practicality of the model components, including variables, constructs, and proposed hypotheses. This process ensured that the model aligns with theoretical foundations and practical implications, providing a sound basis for hypothesis testing and data interpretation. The expert feedback was instrumental in refining the research framework, enhancing its applicability to the UAE public university context, and strengthening the overall robustness of the study's methodological approach

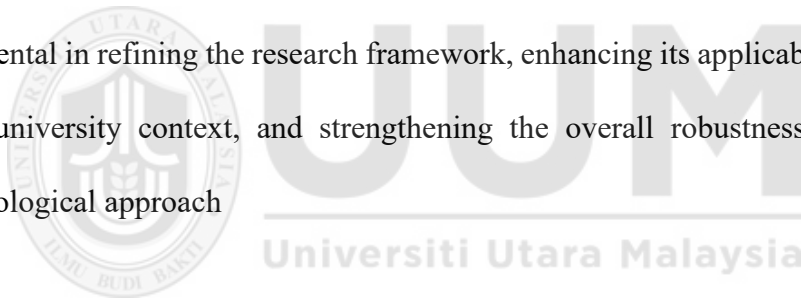


Figure 3.2 visually represents the holistic research journey, illustrating the sequential progression of phases that significantly contribute to the study's objectives and the generation of knowledge. This study aims to investigate SP and OA in public universities in the UAE. It seeks to address research questions and objectives while contributing to the understanding of the complex dynamics involved.

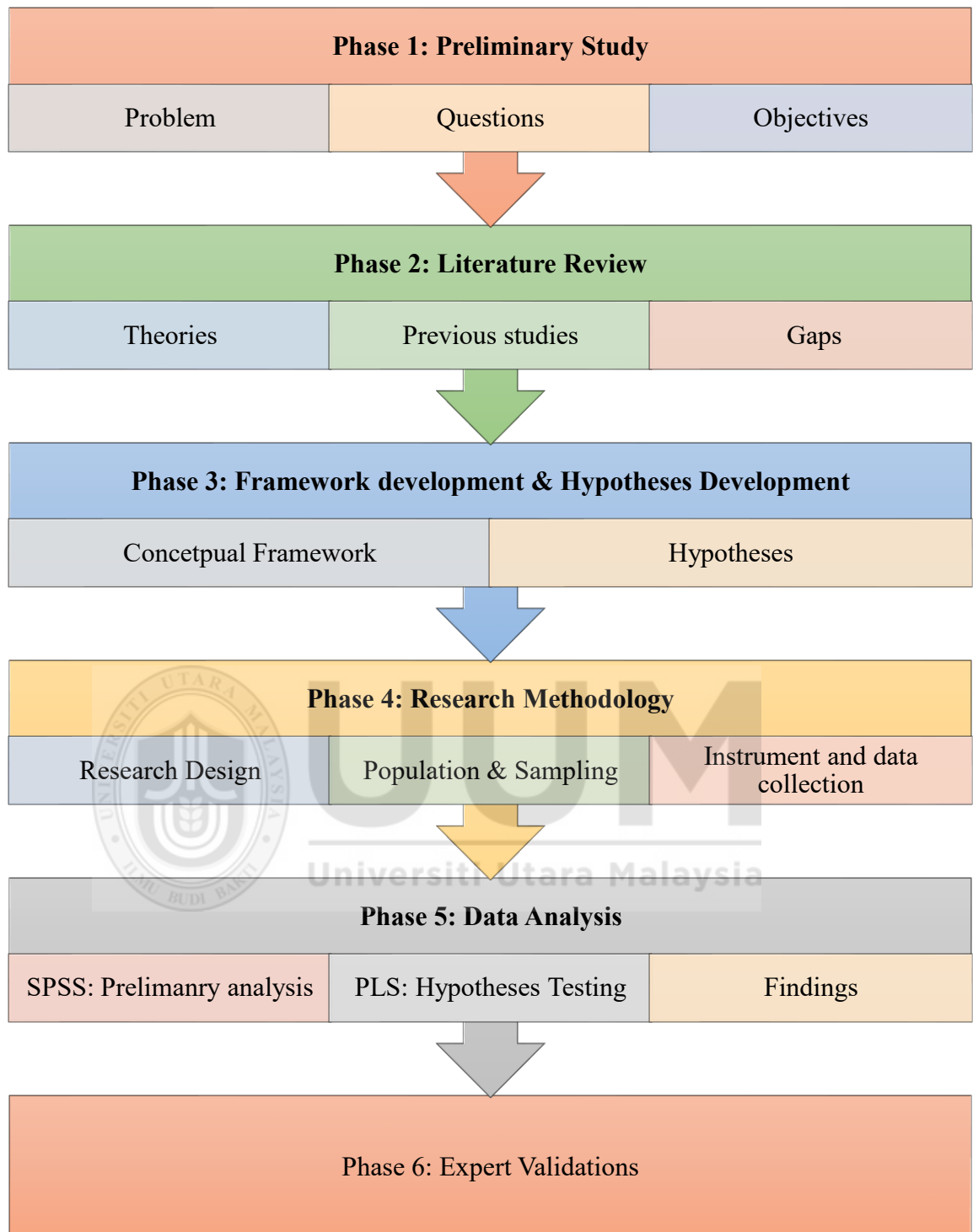


Figure 3.2: Research Process and Design

3.4 Unit of Analysis

The population refers to “the entire group of individuals or elements that are of interest in a particular study or analysis. It encompasses all the units that possess the characteristics being investigated” (Sekaran and Bougie 2019). The scope of the

population is determined by the specific objective. Population, in research, refers to the group of individuals who share common characteristics and are the focus of a study's findings (Fraenkel & Wallen, 2005). Generalizability and applicability of research outcomes rely on a vital foundation. This study focuses on the public universities in the UAE.

The UAE is home to three notable public universities, each with its own distinct identity and substantial contributions to the country's academic achievements. To determine the size of this population, a thorough examination of the official records provided by the Ministry of Education (2023) offers valuable insights. Based on the available records, the UAE is host to a total of three public universities. Academic institutions in the UAE, characterised by distinguished faculties and vibrant campus life, play a crucial role in disseminating knowledge, advancing research, and fostering intellectual growth.

This study focuses on a specific group within public universities, consisting of middle manager. This cohort includes individuals with various roles, such as academic staff members who specialise in teaching, research, and knowledge dissemination. However, they are currently holding a managerial position within the middle management such as department heads, deans, deputy deans, and other staff members at the managerial level who are responsible for effectively administering and providing strategic guidance to these academic institutions.

Based on statistical data obtained from the Ministry of Education (2023), the study population consists of 5,272 individuals. This cohort consists of academic scholars, dedicated educators, and proficient managerial leaders who work together to guide

public universities towards excellence. The participants in this study, who are part of the educational system in the UAE, play a crucial role. Their perspectives and insights are highly valuable and contribute to the study's objectives and research inquiry. In essence, this population consists of middle managers staff in public universities in the UAE. They possess collective knowledge, experiences, and perspectives that can enhance the understanding of SP and OA in this context.

3.5 Sampling

Sampling plays a pivotal role in research methodology, as it involves the careful selection of a subset of individuals from a larger population to ensure that this smaller group accurately represents the broader population. This process is essential for drawing meaningful and valid conclusions, as it allows researchers to generalize findings while managing resources efficiently (Fraenkel & Wallen, 2005). In this study, a stratified simple random sampling technique is employed to enhance representativeness by dividing the population into distinct strata before randomly selecting participants from each group. This approach ensures that various segments of the population are proportionately included, thereby increasing the reliability and relevance of the study's findings.

The rationale for stratification is to create a system of categorisation based on certain characteristics or criteria. This allows for the differentiation and grouping of individuals or entities into distinct strata. The main reason for using stratification is the diversity and heterogeneity found among the three public universities in the UAE. These academic institutions are part of the broader population being studied. However, they differ in terms of their academic missions, programme offerings, and sizes of academic

staff. Each university in the UAE public HE system represents a distinct microcosm within the broader educational landscape. Therefore, stratification is a prudent approach to address these variations, ensuring that the individuals selected for the sample are proportionally representative of each university.

3.5.1 Sampling Techniques

Stratified sampling is a method used to improve the representativeness of a sample. The study includes the three public universities in the UAE, each with its distinct academic and managerial staff members. To ensure representation of the diverse population, a stratified sampling technique is used due to the variations in size and composition among these universities (Fraenkel & Wallen, 2005). Stratified sampling is a method of selecting subgroups or strata from a population in a way that reflects their proportional representation in the overall population (Fraenkel & Wallen, 2005). In this study, each of the three public universities is considered as a distinct stratum, distinguished by its unique composition and nuances within the larger population.

The primary reason for using stratified sampling is to improve the accuracy and representativeness of the sample in relation to a diverse and heterogeneous population. This approach aims to accurately represent the diverse characteristics and contexts of each university, in line with the study's objective of reflecting the complex landscape of public HE in the UAE. Stratified sampling is a statistical technique employed to enhance the representativeness of a sample by ensuring it accurately reflects the characteristics of the broader population. This method involves dividing the population into distinct subgroups, known as strata, which are formed based on specific attributes relevant to the study, such as age, gender, occupation, or education level. Once these

strata are established, a random sample is drawn from each group in proportion to its prevalence within the population. This approach minimizes sampling bias and increases the precision of the results by making sure that each subgroup is adequately represented in the final sample. As a result, stratified sampling is particularly useful in studies that seek to explore variations across different segments of a population, as it provides a comprehensive and balanced view of the data.

The calculation of the total sample size is based on principles of simple random sampling to ensure statistical validity and practical feasibility. This calculation incorporates important variables including desired confidence levels, margins of error, and the total population size. Stratum-specific sample sizes are determined by allocating the total sample size in a way that maintains the proportional representation of each university in the population. This allocation method ensures that each stratum in the final sample is represented proportionally, without any stratum being overrepresented or underrepresented.

Stratified sampling is a method that balances the need for statistical accuracy with the practical considerations of conducting empirical research. This study aims to uncover detailed insights that are both contextually grounded and applicable to public HEI in the UAE, while also respecting the distinct characteristics of each university. In conclusion, the use of stratified sampling is a deliberate choice to improve the study's ability to provide findings that accurately represent the diverse population. This methodological decision aims to achieve a balance between the statistical validity of the sample and its alignment with the unique characteristics of each public university, thereby enhancing the overall quality and depth of the research.

3.5.2 Sample Size

Sample size considerations are important in the context of SEM. In the field of SEM, selecting an appropriate sample size is crucial for research design as it greatly affects the reliability and robustness of model results. This study incorporates fundamental guidelines and insights from contemporary scholars to ensure the validity of the SEM results. Hair et al. (2017) offers valuable insights on sample size requirements for Smart PLS, a sample size of at least 80 respondents is recommended for PLS analysis to obtain reliable and valid results. The threshold, which is commonly seen as the minimum requirement, guarantees statistical rigour and emphasises the modest requirements of PLS.

Kline (2015) conducted a comprehensive review of studies on SEM and provided valuable insights into the typical sample sizes used in this field. Based on a comprehensive analysis of various SEM-based investigations, the author identifies a sample size of approximately 200 responses as representative of a typical benchmark. This figure, supported by Kline (2015)'s comprehensive assessment, demonstrates the prevailing practise in the field of SEM and emphasises the preference for larger sample sizes to ensure reliability.

In this study, the software tool G*Power was used to ensure methodological clarity and specificity in determining the sample size. G*Power is widely recognised in the field. A thorough analysis was conducted using G*Power to determine the minimum sample size required to accommodate three important predictors: KMP, TI, and SP. The analysis findings are summarised in Figure 3.3, which shows that a minimum of 89 respondents is required for the study.

The importance of following these sample size guidelines cannot be emphasised enough. Hair et al. (2017) recommends a minimum sample size of 80 for PLS in SEM, which is considered statistically viable. Additionally, Kline (2015) suggests that larger and more comprehensive samples are beneficial based on typical sample sizes. G*Power's analytical rigour supports the requirement of a substantial sample size, with a minimum of 89 respondents needed to account for the study's predictors. The careful choice of sample size is crucial for obtaining reliable results in SEM. The established criteria and empirical analyses inform the selection of an appropriate sample size for this study, ensuring the integrity and robustness of the research's SEM.

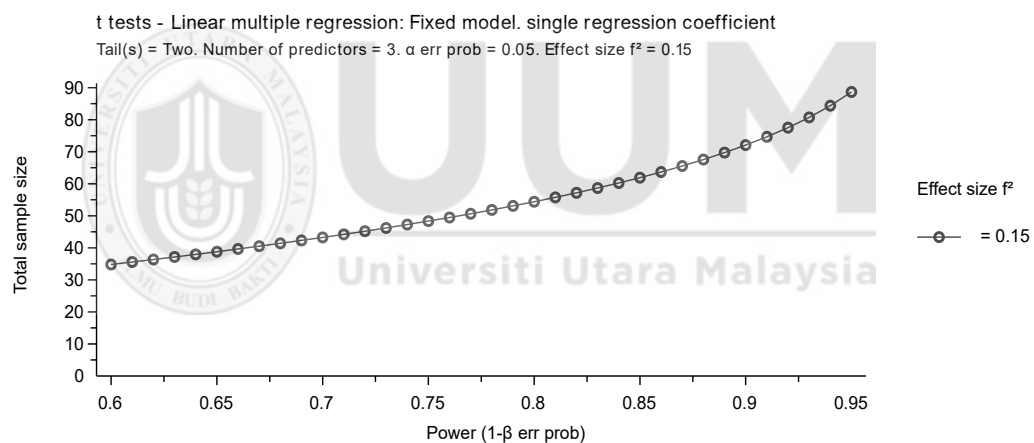


Figure 3.3: G*Power for Sample Size

The sample size for this study was determined using the formula developed by Krejcie and Morgan (1970), a widely accepted method for calculating sample sizes based on population size, confidence levels, and margin of error. The formula allows researchers to establish an appropriate sample size for a given population with a predetermined confidence level and margin of error. In this case, the study's population consists of 5,272 individuals, and the formula calculates a required sample size of 358 respondents. This calculation is based on an alpha (margin of error) of 0.05, which indicates a 5%

chance of error, and a confidence level of 0.95, meaning the researchers are 95% confident that the sample accurately reflects the population.

This sample size is appropriate for the study's objectives and is sufficient for the application of SEM-PLS, a statistical technique used to examine complex relationships between latent variables. SEM-PLS typically requires a larger sample size to ensure reliable and valid results, particularly when testing multiple relationships and paths within a model. The calculated sample size of 358 meets the criteria for SEM-PLS, as it ensures adequate statistical power and accuracy for testing the study's hypotheses. The robustness of the sample size strengthens the reliability of the results derived from SEM-PLS, thus supporting the study's overall methodological rigor.

Table 3.2 provides a breakdown of the population, and the corresponding sample size as calculated using the Krejcie and Morgan (1970) formula. The population for this study ranges between 5,000 and 6,000 individuals, resulting in an estimated sample size between 357 and 361 respondents. This range reflects the formula's precision in determining a sample size that ensures generalisability while minimising the margin of error. By adhering to these guidelines, the study ensures that the sample size is not only adequate but also methodologically sound, enhancing the validity and reliability of the findings drawn from the three universities involved in the research.

Table 3.2: Sample Size

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Source: (Krejcie & Morgan, 1970)

Since this study is using a stratified sampling technique, each of the stratum will be represented based on the population of the university. Table 3.3 shows the population of the three universities. For each university, the percentage of the population was calculated. For example, for UAE university, there are 3,000 academic staff, which constitutes 57% of the population ($3,000 \times 100 / 5,272 = 57\%$). Similar procedures were conducted to calculate the percentage of other universities. To determine the sample size for each university, the proportion of each university within the population was multiplied by the total sample size, then divided by 100. For example, the UAE university constitute 57% of the sample. Thus, to calculate the actual sample size of the university, 57% was multiplied by 358 and divided by 100 ($57 \times 358 / 100 = 204$). All other

actual sample sizes of universities were calculated using the same procedures. Table 3.3 shows the stratified sampling process.

Table 3.3: Stratified Sampling Process

University	Population size	University percentage	Actual sample size
UAE University	3,000	57%	204
Higher Colleges of Technology (HCT)	1,164	22%	79
Zayed University	1,108	21%	75
Total	5,272	100	358

Since it is not possible to know the position of the respondents, a question will be asked about the position and request the respondents to be involved if they belong to the middle management level and to stop otherwise.

3.6 Instrument of the Study

This study utilises a structured closed-ended questionnaire as its main method of data collection. The questionnaire design has been carefully developed, incorporating insights from previous research studies that have investigated the key variables relevant to this study. The questionnaire is structured into three sections, each designed to collect comprehensive and meaningful data from participants. The initial section of the questionnaire serves as an introductory component for the study participants. The submission comprises a cover letter that offers a concise summary of the research objectives and emphasises the significance of the participants' contributions. This section is essential for establishing the context and providing a clear purpose for the participants. Additionally, the study guarantees the confidentiality of participants' responses and adheres to ethical considerations.

The second section of the questionnaire is designed to gather background information from the respondents. Demographic information, such as age, gender, education level,

academic rank, organisational position, and professional experience, is encompassed within this category. This section is important for classifying and comprehending the profiles of the participants, enabling the possibility of conducting subgroup analysis if necessary. Background details can aid in evaluating sample diversity and comprehending the potential impact of various demographic factors on responses.

The third section of the questionnaire is dedicated to collecting data regarding the variables of the study. This section focuses on addressing the research questions and hypotheses. The survey comprises questions and items specifically created to assess the primary constructs and variables being studied. The measurements utilise a five-point Likert scale for respondents to indicate their level of agreement or disagreement with specific statements or items. The decision to use a five-point Likert scale for measurement is influenced by various significant factors. Dawes (2008) and de Winter and Dodou (2010) have found that five-point Likert scales are more efficient and advantageous compared to scales with more response options, such as seven or ten points (Dawes, 2008; de Winter & Dodou, 2010). The measurement of the variables are as follows

The measurement of OA in this study involved using a set of ten items adapted from Rafi et al. (2022). These items were designed to capture various dimensions of agility within an organisation. They assess factors such as the demand for financial transparency, the impact of national regulations, implementation of security measures, the speed and flexibility of responding to market changes, digital transformation, customer loyalty, and the ability to handle interdependencies within organisational processes. Together, these items provide a comprehensive evaluation of how well an

organisation can adapt to internal and external changes, ensuring responsiveness and resilience in a dynamic environment. Table 3.4 shows the measurement of OA.

Table 3.4: Measurement of Organisational Agility

1. “My organisation has a growing demand for financial transparency and accountability.
2. My organisation has a new regulation at the national level.
3. My organisation has new security measures/IS security.
4. My organisation has necessary changes that take too long even to consider implementing into the association and frameworks like major organisational change (e.g. merger, acquisition).
5. My organisation has digitalization of archives and e-signatures.
6. My organisation has shortening of competitors’ time to market new products and services.
7. My organisation has increasing customers’ loyalty
8. My organisation has multichannel requirement whenever or wherever access to data and administrations by clients is required.
9. My organisation has speedy reaction needed to administer clients demands.
10. My organisation has complexity in processes due to increasing number of interdependencies with services of other organisational units.”

The measurement of sustainable performance (SP) in this study comprises three main components: economic performance, environmental performance, and social performance. Each component is assessed using five specific items, resulting in a total of 15 items for evaluating SP. These items, adapted from Iqbal and Ahmad (2021) capture various dimensions of sustainability. Economic performance focuses on aspects such as growth, stability, profitability, and job creation. Environmental performance addresses the organisation’s eco-friendly practices, waste management, and resource usage. Social performance includes elements related to social recognition, empowerment, lifestyle control, and ethical considerations such as avoiding child labour. Together, these components provide a comprehensive evaluation of an organisation’s commitment to sustainable development across economic, environmental, and social domains. Table 3.5 shows the measurement of SP.

Table 3.5: Measurement of Sustainable Performance

Economic Performance
1. “Economic performance of your organisation is at acceptable level in terms of growth.
2. Economic performance of your organisation is at acceptable level in terms of income stability.
3. Economic performance of your organisation is at acceptable level in terms of return on investment.
4. Economic performance of your organisation is at acceptable level in terms of profitability.
5. Your organisation is providing employment opportunities to you and others.
Environmental Performance
1. Your organisation uses utilities (e.g., energy and water) in an environmentally friendly manner.
2. Your organisation produces few wastes and emissions.
3. Your organisation is concerned about waste management.
4. Your organisation uses small space to set up and operate business.
5. Your organisation is concerned about hygienic factors.
Social Performance
1. Your organisation ensures basic needs for your family.
2. Your organisation enhances your social recognition in society.
3. Your organisation improves your empowerment in society.
4. Your organisation provides freedom and control over the course of your own lifestyle.
5. Your organisation is concerned about child labor use.”

The KMP measurement in this study, adapted from Rafi et al. (2022), as shown in Table 3.6, is designed to assess how effectively an organisation manages its knowledge resources. This measurement consists of eight specific items, each capturing a distinct aspect of KM, such as knowledge creation, access to external knowledge, and knowledge sharing within the organisation. Using a five-point Likert scale, respondents indicate the extent to which they agree with each item. The items cover key KM activities, including generating new insights, documenting knowledge in accessible formats, embedding knowledge into organisational processes and products, using knowledge in decision-making, transferring knowledge across departments, and evaluating the impact of knowledge assets. Together, these items provide a comprehensive view of the organisation’s ability to leverage knowledge for improved performance and strategic decision-making.

Table 3.6: Measurement of Knowledge Management Process

1. “My organisation members generate new knowledge
2. My organisation members access valuable knowledge from external sources
3. My organisation members facilitate knowledge growth through culture and incentive
4. My organisation members represent knowledge into documents, databases and software
5. My organisation members embed knowledge into processes, products and/or services
6. My organisation members use accessible knowledge in decision-making
7. My organisation members transfer existing knowledge into other parts of the organisation
8. My organisation members measure the value of knowledge assets and/or impact of knowledge management”

The measurement of TI in this study, adapted from Donbesuur et al. (2020), consists of several items that capture key aspects of an organisation's innovative capacity. Each item represents a dimension of TI that is relevant to the university’s operational and strategic goals. The items include the university’s ability to expand its range of offerings (such as programs or services), replace outdated products, continuously develop and improve existing programs, and reduce production costs. Additional items assess how effectively the university integrates its production management activities, enhances organisational flexibility, and reduces its environmental impact. Together, these items provide a comprehensive evaluation of TI, reflecting the university’s commitment to innovation, operational efficiency, adaptability, and sustainability. This multi-dimensional approach to measuring TI highlights its role in maintaining competitiveness and responsiveness in a dynamic environment. Table 3.7 shows the measurement of TI.

Table 3.7: Measurement of Technological Innovation

1. The university can extend its range of products.
2. The university can replace products that are obsolete.
3. The university continues to develop and improves programs.
4. The university continues to reduce cost of production.
5. The university efficiently integrates production management activities.
6. Improve organisational flexibility.
7. Lower environmental impact.

3.7 Validity and Reliability

Ensuring the validity and reliability of the instrument is a crucial step in research, as it enhances the precision of the measurement (Sekaran & Bougie, 2019). The data collection instrument was validated in this study, and a pilot study was conducted to evaluate the reliability. The subsequent sections provide a comprehensive analysis of the validity and reliability.

3.7.1 Validity

Validity is defined as “the degree to which an instrument measures what it is supposed to measure” (Kimberlin & Winterstein, 2008). In order to ensure the reliability of their instrument, researchers must undergo a thorough validation process, as suggested by Hair et al., (2006). According to Zikmund et al. (2013), it is advisable for researchers to seek the input of experts in order to enhance the reliability of their measurements and gather pertinent information. In this study, the questionnaire was translated into Arabic using the service of sworn translator and academic experts in the field of management. as part of this validation, the questionnaire was translated into Arabic by a sworn translator, and three bilingual experts in the field of management were invited to assess the accuracy and quality of the translation, as well as the overall suitability of the measurement.

These experts were asked to review and validate the measurement of the variables. The experts indicated that some terms in Arabic can be translated differently and indicate different meaning. Therefore, they suggested the terms to be consistent and corrected. This adjustment ensured that respondents would interpret the question as intended, focusing on technological aspects rather than general creativity. Another expert

provided feedback on the clarity of the items related to KMP. They noted that one of the questions, which asked used complex terminology that could confuse participants unfamiliar with academic jargon. The expert recommended simplifying the question by making the question more accessible to a wider audience without losing its meaning.

The third expert commented on the numbering of the questions as well as the clarity of some items. All the comments of the experts were addressed accordingly, and correction has been made to improve the clarity of the items. After these revisions, the questionnaire was converted into an online format for distribution and further testing, ensuring it was ready for reliability analysis and data collection.

This validation process not only refined the instrument but also demonstrated the importance of expert feedback in enhancing the accuracy and clarity of research tools. By addressing specific linguistic, conceptual, and structural issues identified by the experts, the study strengthened the validity of its measurement, ensuring that the final questionnaire effectively captured the intended data.

3.7.2 Reliability

Upon validating the measurements, a pilot study was conducted to ensure their reliability. As advised by Lackey et al. (1998), a pilot study should encompass 10% of the total sample. In the context of this study, which involves 358 respondents, the estimated number of respondents should be 36. However, due to concern of low response rate, the number was doubled to 72 questionnaires. As outlined by Sekaran and Bougie (2019), Cronbach's Alpha (CR) serves as a reliability coefficient that gauges the positive correlations between items within a set. A CR value exceeding 0.7 is

indicative of acceptable and favourable reliability, while a value below 0.7 is considered inadequate.

A pilot study was conducted by sending online questionnaire to academic in private universities in UAE. A total of 72 questionnaires were sent. After following up, only 38 questionnaires were collected. Four of the questionnaires were removed due to large missing values. This has resulted in analysing 34 responses. The CA of the variables were assessed. Based on Sekaran and Bougie (2019), a value of CA higher than 0.70 is considered acceptable. Table 3.8 shows the results of testing the Cronbach's Alpha. It shows that all the variables have an CR greater than 0.70 indicating that the measurement are reliable.

Table 3.8: Result of Pilot Study (N=34)

Variable	Number of items	Cronbach's Alpha	Conclusion
OA	10	0.780	Reliable
SP	15	0.890	Reliable
KMP	8	0.938	Reliable
TI	7	0.790	Reliable

3.8 Data Collection

Data for this research study was collected through a questionnaire administered using the Google Forms application. The questionnaire was provided in English and Arabic, with Arabic being crucial as it is the official language of the UAE. In the context of the UAE, the distribution of the questionnaire involved seeking collaboration with three universities. These universities were instrumental in engaging potential respondents from their academic staff and relevant stakeholders. The contact details of academic staff members were obtained from the official websites of universities, and this information is gathered for the purpose of outreach.

A total of 358 questionnaires was distributed to the participants identified for this study. To increase the response rate, a follow-up procedure was implemented, which involved reminders and additional communication with potential respondents to emphasise the significance of their participation in the study. In the first month, a total of 121 responses were collected. A follow up and reminders were applied, and this has increased the response rate to 352 responses. This percentage is 98.3% which is accepted. The responses are above 200 which is the minimum responses for using Smart PLS. Therefore, the responses are sufficient for using Smart PLS.

3.9 Data Analysis

The data analysis in this study was performed using SPSS version 26.0 and Smart SEM-PLS version 4, each of which served specific purposes within the analytical process. SPSS was employed for preliminary data analysis, including data cleaning, descriptive statistics, and assessment of assumptions such as normality, missing values, and outliers. This initial step ensured that the data met the necessary conditions for further analysis and provided an overview of the sample characteristics.

Following the preliminary analysis in SPSS, Smart SEM-PLS version 4 was utilized to test the research hypotheses and examine the relationships within the conceptual model. SEM-PLS is particularly suited for analysing complex models with multiple constructs and was chosen for its robustness in handling non-normal data distributions and its flexibility with small to moderate sample sizes. In this study, SEM-PLS allowed for the examination of both the measurement model, to assess construct validity and reliability, and the structural model, to test the hypothesized relationships among variables.

The following sections provide a detailed breakdown of the analysis steps, starting with the descriptive analysis in SPSS, followed by the assessment of the measurement model, and concluding with the structural model evaluation in Smart SEM-PLS. This structured approach ensures a thorough and rigorous examination of the data, enabling robust insights into the relationships among KMP, TI, SP, and OI.

3.9.1 Preliminary Analysis

Before proceeding to conduct analysis on the data, researchers suggested that the raw data must be filtered and screened for “missing values, outliers, normality, multicollinearity and non-response bias” (Hair et al., 2017; Hair et al., 2023). The rules of tested these analyses and the acceptable procedures are discussed in the following sections.

3.9.1.1 Replacing Missing Value

The first step in data analysis is to conduct a comprehensive assessment of data completeness. This critical procedure ensures the reliability and readiness of the dataset for subsequent analysis. To evaluate data completeness, it is commonly advised by Hair et al. (2023) to identify and resolve any missing values. Responses with a high proportion of missing values, typically exceeding 15%, are generally considered unreliable and may be excluded from the analysis. One effective approach for handling missing values below a certain threshold is to impute them with the mean value of the variable. This method helps maintain the integrity of the dataset. This study will utilise the SPSS to conduct missing value analysis. Frequency analysis, a key component of SPSS, will be used to determine the presence of missing values in each variable. This

systematic examination will help the research decide how to handle missing data, ensuring that subsequent analyses are based on a complete and reliable dataset.

3.9.1.2 Outliers

Outliers are extreme values that are far from the mean score. Researchers suggested that data must be cleaned from outliers (Hair et al., 2017). The rule is to examine the boxplot of the mean score value of the variables. Any values that far from the mean is an outlier and it must be removed (Hair et al., 2017). In this study, the boxplots of all variables will be investigated.

3.9.1.3 Normality

One of the assumptions of regression analysis is the normal distribution of data (Hair et al., 2017). Two methods are suggested to examine the normality of the data. The first is by checking the value of skewness and kurtosis. Normal data will have a value of skewness and Kurtosis less than absolute two (2) (George & Mallery, 2008; Pallant, 2020). In the second method, the shape of the histogram must be investigated. A bell-shaped of the histogram is an indication that the data is normally distributed (Pallant, 2020; George & Mallery, 2008). In this study, the shapes of the histogram and values of Skewness and Kurtosis will be checked.

3.9.1.4 Multicollinearity

Multicollinearity is a prevalent concern in regression analysis, occurring when there are significant correlations among the independent variables (Pallant, 2020). To enhance the reliability of the analysis, the study will utilise established techniques to evaluate and mitigate issues related to multicollinearity. Pallant (2020) suggested using the

“Variation Inflation Factor” (VIF) and tolerance as two primary indicators for identifying multicollinearity. To determine that multicollinearity is not a significant issue, it is generally preferred for the VIF values to be below 10 and the tolerance values to be above 0.10. Hair et al. (2017) recommended a stricter criterion for addressing multicollinearity, suggesting that VIF values should be below 5 and tolerance values should be above 0.20. This study will thoroughly evaluate multicollinearity among the independent variables through the calculation of VIF and tolerance values. By utilising these predetermined thresholds, it can guarantee that the regression analysis is performed on a dataset that is not affected by multicollinearity, thereby improving the dependability and accuracy of the results.

3.9.1.5 Non-Response Bias

Non-response bias is a crucial factor in research that requires careful attention. This concerns the potential variations in responses between study participants and non-participants. Addressing non-response bias is essential as it can affect the validity and generalizability of research findings. In this study, the study will undertake the following steps to thoroughly evaluate and address this bias. To differentiate early and late respondents, a time-based criterion will be employed. Early respondents are defined as individuals who submit their responses within the first 30 days of the data collection period. Late respondents refer to individuals who submit their feedback after the specified initial timeframe. This categorization is consistent with the recommendations of survey “research methodology” experts, including Vink and Boomsma (2008).

The independent sample t-test will be used to compare the responses of early and late respondents on key variables in the study. The purpose of this test is to detect any notable disparities between the two groups. Statistically significant differences may indicate the existence of non-response bias. It is essential to consider these differences to ensure the reliability of the results. Levene's test for equality of variances will be used to assess the significance level as part of the analysis. This step is crucial for assessing the homogeneity or heterogeneity of variances in responses between early and late respondents. A significance level below 0.05 suggests unequal variances, which may indicate the presence of non-response bias. On the other hand, if the significance level is greater than 0.05, it indicates that non-response bias is not a significant issue, which increases the trust in the findings of the study.

The analysis process, including the independent sample t-test and Levene's test, will be conducted using SPSS. SPSS is a powerful software tool that facilitates efficient and accurate execution of various statistical analyses by researchers. The study will carefully follow these steps and use the independent sample t-test and Levene's test to examine the existence and magnitude of non-response bias in this study. Adopting a diligent approach is crucial for ensuring the reliability, credibility, and validity of the research results by minimising potential biases.

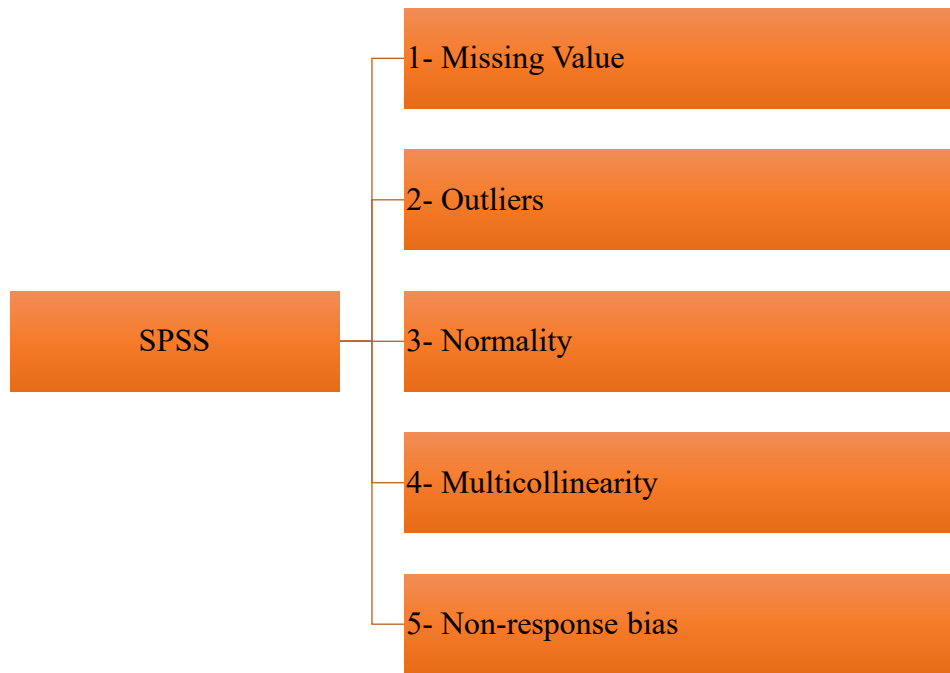


Figure 3.4: SPSS Analyses process

3.9.2 Structural Equation Modelling

Scholars (Hair et al., 2019; Joe Hair et al., 2023; Joseph Hair & Alamer, 2022) have conducted comparative analyses of two widely used approaches in SEM: covariance-based SEM (CB-SEM) and SEM-PLS. The researchers' discoveries have generated valuable insights, which have ultimately resulted in recommendations in support of Smart PLS. This is due to its superior ability to test mediating associations. In this study, Smart PLS 4 was chosen for the analysis, as it is widely recognised among researchers for its effectiveness. Contemporary research models have become more complex, leading to debates about the nature of constructs, specifically whether they are unidimensional (first order) or multidimensional (second order). To provide further clarification on this concept, it is crucial to differentiate between first order and second-order constructs. A second-order latent variable is defined by indicators that are latent variables, indicating a higher level of abstraction and complexity in the model (Hair et al., 2011; Lowry & Gaskin, 2014).

The differentiation between first and second-order constructs has important implications for both research design and statistical analysis. First-order constructs represent observable facets of a construct, while second-order constructs encompass a higher level of abstraction by integrating multiple first-order constructs. This nuanced understanding allows researchers to develop more comprehensive models that effectively capture the multifaceted nature of complex phenomena. This study utilises Smart PLS 4 and acknowledges the inclusion of second-order constructs, aligning with current research methodologies that recognise the complexities of modern research models and the necessity of advanced statistical tools to analyse them. This approach improves the thoroughness and precision of the analysis, enabling the study to investigate complex associations and intervening mechanisms within the scope of the study.

In this study, all the variables are first order. Second and first-order constructs could be reflective or formative (Hair et al., 2017). Reflective indicators can be interchangeable. This means the removal of one item has no impact on the essential nature of the underlying construct. On the other hand, the formative indicators will change if one of the items is deleted (Hair et al., 2023). In this study, all the first order are reflective. This is because the items are interchangeable. Deleting one of the dimensions or items will not cause any change in the construct the dimension. Thus, this study is using a reflective indicator approach.

3.9.2.1 Assessment of the Measurement Model

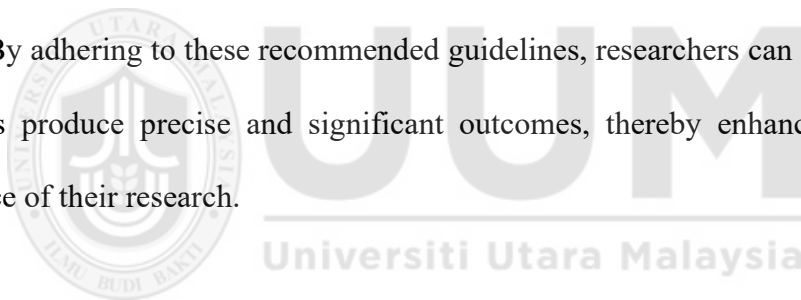
A two-stage approach has been proposed by researchers to evaluate models using PLS. The measurement model (MM) and the structural model (SM) are two stages that are

crucial for ensuring the robustness and validity of the overall model. During the initial phase, the MM is investigated, which includes the evaluation of five essential components. Internal consistency is evaluated by using measures such as CA and “composite reliability” (CR) to determine the reliability and consistency of the constructs being measured. High values of CA and CR, typically above 0.70, indicate that the measurement items effectively capture the underlying constructs with reliability. Researchers generally favour CR over CA due to its higher accuracy in assessing reliability, particularly when dealing with models that involve multidimensional constructs.

Factor loadings play a crucial role in assessing the strength and significance of the associations between indicators and their respective constructs. Values greater than 0.70 indicate strong associations, suggesting that the items accurately represent the intended constructs (Hair et al., 2023). Researchers frequently examine items with low factor loadings to determine if they should be refined or eliminated to improve the overall reliability of the model.

“Convergent validity” is essential for confirming that the items accurately measure the same underlying construct. The “average variance extracted” (AVE) is a measure that quantifies the extent to which a set of items collectively explains the variance of a construct. It is typically expected to be greater than 0.50. A high AVE suggests that the measurement items effectively capture a substantial amount of the underlying construct's variability (Hair et al., 2023).

“Discriminant validity” is evaluated to ensure the distinctiveness of constructs. The conventional approach for assessing discriminant validity is Fornell and Larcker's criterion, which involves comparing the square root of AVE with cross-loadings. The “heterotrait-monotrait ratio of correlations” (HTMT) has emerged as a robust method. A HTMT value less than 0.85 suggests that the constructs have minimal overlap and are distinct from each other. The SM extends the foundation of the MM by analysing the intersections among constructs. This stage employs hypothesis testing and structural path analysis to ascertain the significance and direction of these associations. These evaluations collectively guarantee the rigour and validity of the research model. Researchers follow a series of steps to improve the credibility of their findings, strengthen their models, and make meaningful contributions to knowledge in their fields. By adhering to these recommended guidelines, researchers can ensure that their analyses produce precise and significant outcomes, thereby enhancing the overall influence of their research.



3.9.2.2 Assessment of the Structural Model

The assessment and evaluation of the SM. In the field of SEM, evaluating the SM is an essential step to determine the reliability and validity of research results. Researchers use specific criteria and metrics to evaluate different aspects of the model's performance. The R-squared (R^2) statistic measures the degree to which the model explains the variability in the dependent variable. This is crucial for assessing the degree of alignment between the model and the theoretical framework. The interpretation of R^2 values is contingent upon the specific context. Chin (1998) categorises R^2 values into three groups: weak (0.19 or less), moderate (between 0.19 and 0.33), and substantial (0.33 or greater). Hair et al. (2011) categorise R^2 values as weak (less than 0.25),

moderate (between 0.25 and 0.50), and substantial (between 0.50 and 0.75). It is crucial to acknowledge that these thresholds function as reference points and should be interpreted within the context of the study.

Predictive relevance, also known as Q^2 , has historically been used to evaluate a model's capacity to forecast future observations. Recent advancements in SEM, specifically in Smart PLS 4, have rendered Q^2 obsolete as it duplicates other analyses. Researchers increasingly rely on alternative measures to assess predictive validity. The path coefficient, denoted as β , is a key component in evaluating SMs. It includes both the size and statistical significance of associations, as well as their direction. A positive β denotes a positive correlation between variables, while a negative β indicates a negative relationship. Researchers use bootstrapping procedures to assess the statistical significance of the path coefficient. It is recommended to use a minimum of 5,000 bootstrap samples for this analysis (Hair et al., 2011). Significance is assessed by comparing to critical t-values, with a value of 1.96 indicating significance at the 0.05 level, and 2.58 at the 0.01 level (Hair et al., 2014).

The effect size, measured by Cohen's f^2 , enhances the evaluation of the SM. This method assesses the practical importance of associations in the model by quantifying the change in R^2 when a specific construct is excluded. An f^2 value greater than 0.02 is commonly regarded as indicating a significant effect size. Values below this threshold indicate a low path coefficient and are typically deemed inadequate. Effect sizes are categorized into three levels: small (0.02), medium (0.15), and large (0.35), according to the guidelines established by Cohen (1988). Smart PLS 4 simplifies the process by

generating f^2 as an output, eliminating the requirement for manual calculations (Hair et al., 2017).

In summary, these criteria provide guidance for researchers navigating the complexities of SM. Through careful evaluation of the SM using these elements, researchers can gain valuable insights and ensure the reliability of their research findings. These practises are crucial for ensuring the rigour and validity of empirical studies across different fields of research. To summarize the criteria and the acceptable value in evaluating the measurement and SM, Table 3.9 shows a summary of these criteria.

Table 3. 9: Criteria for Assessing the MM and SM

Measurement Model	Structural model
Factor loading >0.70	R-square 0.19 (weak), 0.33 (moderate), 0.60 (strong).
“CA and Composite reliability (CR) should be greater than 0.70”.	Coefficient (Hypotheses testing)
“Convergent validity” (AVE >50)	
“Discriminant validity” (HTMT’s correlation is less than 0.85) and root square of AVE is greater than indicator loading.	“F-square (effect size) value is. 0.02 (weak), 0.15 (moderate), 0.35 (strong)”

3.9.2.3 Mediation Testing

Researchers (Hair et al., 2017; Lowry & Gaskin, 2014) indicated that when using Smart PLS, the mediator testing should first test the direct effect between the independent variable (IV) and the dependent variable (DV) without the mediator. Next, once the mediator included and reduced the effect of IV on the DV, then it can be concluded that the variable is mediating the effect of IV on DV. However, full mediation is assumed when the effect of IV on DV is no longer significant after including the mediator, and a partial mediation is assumed when the effect of IV on DV stays significant after

including the mediator (Hair et al., 2017; Lowry & Gaskin, 2014). In this study, the mediating effect of SP between TI and KMP on OA will be tested.

Overall, Figure 3.4 summarizes the analysis that are explained above using SEM-PLS. the analysis consists of two main models' assessment. The MM is assessed by the factor loading (FL), reliability (CA and CR), "convergent validity" (AVE>0.50) and "discriminant validity". The SM is assessed by R-square, F-square (effect size), and path coefficient. The path coefficient will be used to test the hypotheses of this study.

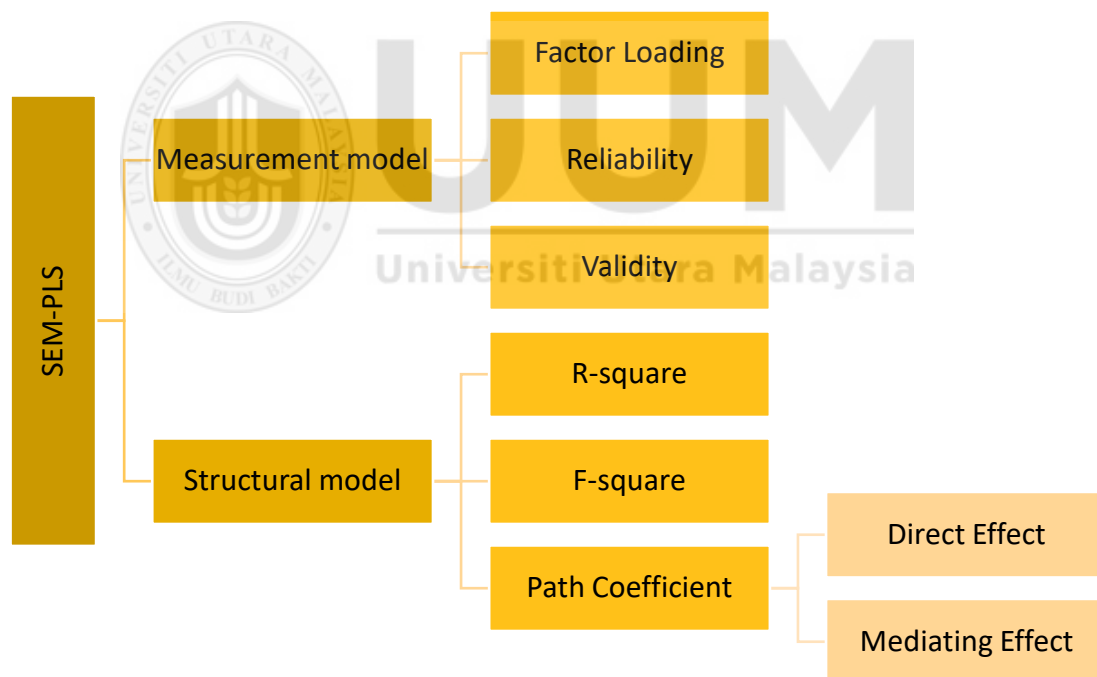


Figure 3.5: Process of SEM-PLS Analyses

3.10 Summary

This chapter presents a detailed summary of the “research methodology” utilised in the current study. The chapter starts by explaining the research design and describing the population and sampling procedures that were carefully considered during the research planning phase. Additionally, this study introduces the instrumentation used, emphasising its importance in capturing the necessary data. The chapter explores the essential procedures involved in ensuring the “validity and reliability” of the research instrument. These processes are crucial for ensuring the accurate representation and consistent measurement and analysis of the collected data. This chapter provides an overview of the data collection process, including the strategies and techniques used to gather information from the participants. Additionally, it describes the subsequent data analysis methods that will be used to extract valuable insights from the gathered data. This study utilises a multifaceted approach for data analysis. The data will be rigorously analysed using both SPSS and SEM-PLS. The dual-analysis strategy is selected for its ability to offer a thorough and strong examination of the research findings.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter outlines the results of the study. The chapter is organised into seven sections. This section provides an overview of the chapter. In the second section, the process of data examination is discussed. This involves checking for “missing values, outliers, normality, multicollinearity, and non-response bias”. In the third section, the background information of the respondents is discussed, followed by the descriptive information of the variables. In the fourth section, the Smart PLS is examined. Next, the hypotheses testing is conducted. The hypotheses testing involves the examination of both direct effect hypotheses and mediating effect hypotheses. In the final section, the findings of this study are summarized.

4.2 Data Examination

An analysis of the data is performed to evaluate its quality and enhance its reliability. The analyses involve examining missing values through frequency analysis in SPSS, investigating outliers using boxplots, assessing normality through skewness, kurtosis, and histograms, and evaluating multicollinearity by checking tolerance and variation inflation factor (VIF). An examination of non-response bias involves conducting an independent sample t-test to compare the difference between early and late respondents. The purpose of these analyses was to process the data for subsequent analysis, including descriptive and structural equation modelling.

4.2.1 Missing Value

In this study, a total of 352 responses were collected. Missing value analysis was conducted by entering all the items into SPSS. The analysis showed that 14 responses having more than 15% missing values of the required answers. This means that the respondents have answer the questionnaire but more than 15% of the answers in one response is missing. Therefore, a total of 14 responses were removed. Other responses miss less than 5% of the answers and they were replaced by the mean score as suggested by Hair et al. (2017). Therefore, 338 responses were complete.

4.2.2 Outliers

Outliers were thoroughly examined using the boxplot method, as recommended by Pallant (2020), to ensure the accuracy and reliability of the dataset. The boxplot is a useful tool for identifying extreme values or outliers that may skew the data or affect the results of statistical analyses. In this study, any data points that were significantly distant from the mean score and central tendency were considered outliers. Specifically, values that fell far outside the interquartile range and were visually identifiable as outliers on the boxplot were removed to maintain the integrity of the analysis. As a result, a total of 21 responses were deleted from the dataset because they exhibited extreme values that could distort the overall findings.

Following the removal of these outliers, the dataset comprised 319 complete and usable responses, which were then utilised for the subsequent data analysis in this study. The decision to exclude these responses was made to enhance the validity of the results and reduce the likelihood of any anomalies influencing the statistical outcomes. By focusing

on the data within a reasonable range of variability, the analysis aimed to provide more accurate and generalisable insights.

The boxplots of the variables, illustrating the outlier detection process, are provided in Appendix B, offering a visual representation of how the outliers were identified and removed. Additionally, the response rate and data collection process are summarised in Table 4.1. The table outlines the steps taken during data collection, including the total number of distributed questionnaires, the process for addressing missing values, and the identification and removal of outliers. The table provides a clear overview of the data examination process, culminating in the 319 responses used for the final analysis.

Table 4. 1: Data Examination and Response Rate

Activity	Procedures	Conclusion
Distributed questionnaire	A total of 358	A total of 352 was collected
Missing value	Frequency analysis	338 (14 responses were removed)
Outliers	Boxplot	319 (21 responses were removed)
Final analysed data	-	319 responses.

This systematic approach to data cleaning ensures that the final dataset is robust, minimising the influence of outliers or missing data that could potentially compromise the results of the study. The careful screening of outliers and the handling of missing data contribute to the overall rigour and credibility of the findings presented in the following chapters.

4.2.3 Normality

To assess the normality of the data, skewness, kurtosis, and histograms were examined, which are standard methods used to evaluate whether data conforms to the assumptions of normality. Skewness measures the asymmetry of the distribution, while kurtosis evaluates the sharpness or flatness of the distribution relative to a normal distribution. According to Hair et al. (2023), values of skewness and kurtosis should be less than 1 for the data to be considered normally distributed, while Pallant (2020) similarly recommends this threshold for normality assessments.

Table 4.2 presents the results of the normality analysis for the key research variables: OA, SP, KMP, and TI. The analysis reveals that all the variables meet the normality assumptions. Specifically, the skewness values range from -0.688 to -0.353, with KMP exhibiting the highest skewness (-0.688), indicating a slight leftward tilt, but well within acceptable limits. Similarly, the kurtosis values range from 0.661 to 0.833, with TI showing the highest kurtosis value (0.779), suggesting that the distribution is normal.

Table 4. 2: Normality Analysis

	N	Skewness<1		Kurtosis<1	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
OA	319	-0.591	.137	0.672	.272
SP	319	-0.417	.137	0.833	.272
KMP	319	-0.688	.137	0.661	.272
TI	319	-0.353	.137	0.779	.272

The skewness and kurtosis values for all the variables fall below the absolute value of 1, thus satisfying the criterion for normality as per Hair et al. (2023) and Pallant (2020). This conclusion is further supported by the visual inspection of the histograms, which show bell-shaped curves for each variable, confirming that the data follows a normal distribution. The histograms, which can be found in Appendix C, provide a graphical

representation of the normality of the dataset, with all distributions adhering closely to the shape of a normal bell curve. Therefore, both the statistical values for skewness and kurtosis, as well as the visual analysis of histograms, demonstrate that the data is normally distributed.

4.2.4 Multicollinearity

Multicollinearity arises when there is a high degree of correlation among independent variables within a regression model, which can compromise the reliability of coefficient estimates by inflating standard errors and reducing the precision of the model's outputs. Detecting multicollinearity is essential, as it can obscure the distinct contributions of each variable to the model. Researchers typically examine the 'variance inflation factor' (VIF) and tolerance values to evaluate the extent of multicollinearity. The VIF indicates how much variance of an estimated regression coefficient is increased due to multicollinearity, while tolerance reflects the proportion of variance in an independent variable that is not explained by other variables in the model. Hair et al. (2023) suggest that a VIF below 5 and a tolerance value greater than 0.20 are reasonable indicators that multicollinearity is within acceptable limits, ensuring the stability of the model and the reliability of its coefficients.

In this study, the multicollinearity diagnostics were performed by calculating the tolerance and VIF values for each variable. As presented in Table 4.3, the highest VIF was recorded for TI at 3.181, while the tolerance value for TI was 0.314. Both of these values fall within the acceptable ranges, as the VIF is below 5, and the tolerance is above 0.20, thus satisfying the criteria for multicollinearity. This suggests that the correlation

between TI and the other variables does not pose a threat to the reliability of the regression estimates.

Similarly, the KMP and SP variables showed VIF values of 2.994 and 2.995, respectively, with tolerance values of 0.334 for both variables. These results are also well within the acceptable limits, further confirming that multicollinearity is not an issue in the model. The consistent findings across all variables indicate that none of the independent variables exhibit problematic correlations with one another, ensuring the robustness of the analysis.

Table 4. 3: Multicollinearity Analysis

Variable	Tolerance>0.20	VIF<5
SP	.334	2.995
KMP	.334	2.994
TI	.314	3.181

a. Dependent Variable: OA

Since all VIF values fall below the threshold of 5 and all tolerance values exceed 0.20, it is reasonable to conclude that multicollinearity is not an issue in this study. These results adhere to the standards recommended by Hair et al. (2023), indicating that the independent variables can be reliably included in the regression model without multicollinearity affecting the validity of the findings. This alignment with established guidelines strengthens the model's robustness, allowing for clearer interpretations of the relationships among variables.

4.2.5 Non-Response Bias

Non-response bias occurs when there are systematic differences between individuals who respond to a survey and those who do not, potentially skewing the study's findings

if this bias remains unaddressed (Lambert & Harrington, 1990). To mitigate the risk of non-response bias and ensure the reliability of the results, various strategies can be implemented, such as follow-up with non-respondents or comparing early and late respondents to detect any notable differences. By proactively addressing non-response bias, researchers enhance the representativeness of the sample, thereby improving the validity and generalizability of the study's conclusions, Armstrong and Overton (1977) proposed a method where early and late respondents are compared, as late respondents are thought to mirror non-respondents. Following this approach, Vink and Boomsma (2008) recommend classifying participants who respond within the first 30 days as early responders, and those who respond after this period as late responders. In this study, out of the 319 total participants, 211 participants (66%) were categorised as late responders, while 108 participants (34%) were classified as early responders.

To determine whether non-response bias was present, an independent sample t-test was conducted to compare early and late respondents across the main variables of the study: OA, SP, KMP, and TI. This statistical test is commonly used to assess whether there are significant differences in the mean responses of two groups—in this case, early and late participants. The Levene's test for equality of variances (LTEV) was used to evaluate whether the assumption of equal variances between the two groups was met, as recommended by Pallant (2016). If the LTEV significance values are above 0.05, the assumption of equal variances is supported, indicating no significant differences in variability between groups.

The results of the independent sample t-test showed no significant differences between the early and late responders across all the main variables of the study. The significance

values for equal variances in OA (0.160), SP (0.098), KMP (0.114), and TI (0.201) were all above the 0.05 threshold, confirming that the variances between the two groups were equal. Additionally, the Sig (2-tailed) values for each variable exceeded 0.05, suggesting that no significant differences were found in the mean scores between early and late respondents.

For instance, the mean difference in OA between early responders (mean = 3.5961) and late responders (mean = 3.6039) was minimal, with a mean difference of -0.00078 and a significance value of 0.130, which is well above the 0.05 level of significance. Similarly, for SP, early responders had a mean of 3.2867 compared to 3.4798 for late responders, with a mean difference of -0.19310 and a significance value of 0.109, indicating no significant difference between the two groups. The same pattern was observed for KMP and TI, where the significance values were 0.320 and 0.294, respectively, further confirming the absence of significant differences between early and late responders.

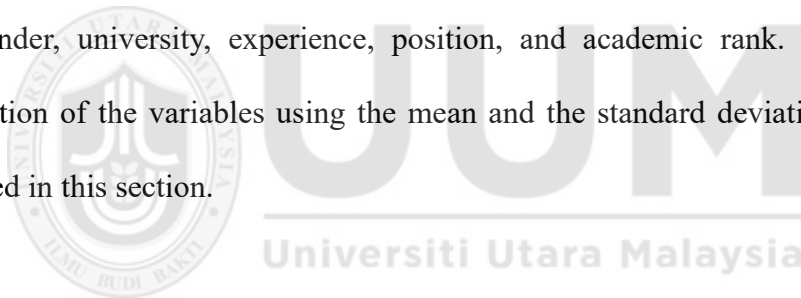
The results presented in Table 4.4 confirm that non-response bias is not a concern in this study. The lack of significant differences between early and late responders suggests that the responses are representative of the entire population sampled, and that non-participation by some individuals did not introduce bias into the findings. This robust analysis ensures the validity and generalisability of the study's results, enhancing the overall credibility of the research conclusions.

Table 4. 4: Independent Sample T-test for Non-Response Bias

Variables	Group	N	Mean	Mean difference	LTEV (sig)	Sig (2-tails)
OA	Early Response	108	3.5961	-.00078	.160	.130
	Late Response	211	3.6039	-.00078		.121
SP	Early Response	108	3.2867	-.19310	.098	.109
	Late Response	211	3.4798	-.19310		.108
KMP	Early Response	108	3.1909	-.06800	.114	.320
	Late Response	211	3.2589	-.06800		.319
TI	Early Response	108	3.2681	-.04970	.201	.294
	Late Response	211	3.3178	-.04970		.291

4.3 Descriptive Information

This section presents the background information of the respondents. It includes the age, gender, university, experience, position, and academic rank. The descriptive information of the variables using the mean and the standard deviation (Std) is also discussed in this section.



4.4.1 Background Information of Respondents

The respondents' profile is presented in Table 4.5, which includes their background information. Precisely, the descriptive information of the respondents includes age, gender, university, experience, position, and academic rank.

Table 4. 5: Respondents Descriptive Information

Variable	Label	Frequency	Percent (%)
Age	Less than 30 years	8	2.5
	30-40 years	48	15.0
	41-50 years	167	52.4
	51-60 years	86	27.0
	Above 60 years	10	3.1
	Total		319

Gender	Male	236	74.0
	Female	83	26.0
	Total	319	100.0
University	UAE University	192	60.2
	Higher Colleges of Technology (HCT)	70	21.9
	Zayed University	57	17.9
	Total	319	100.0
Experience	Less than 3 years	9	2.8
	3-7 years	237	74.3
	8-11 years	39	12.2
	12-15 years	34	10.7
	Total	319	100.0
Position	Head of department	54	16.9
	Deputy of dean	31	9.7
	Dean	9	2.8
	Lecturer	150	47.0
	Other	75	23.5
	Total	319	100.0
Academic Rank	Lecturer	38	11.9
	Senior Lecturer	159	49.8
	Assistant Professor	74	23.2
	Associate Professor	38	11.9
	Professor	10	3.1
	Total	319	100.0

The age of the respondents showed that 167 or 52.4% are in the age group between 41 to 50 years followed by 86 or 27.0% in the age of 51 to 60 years. Those in the age between 30 to 40 years accounted for 48 or 15.0%. Respondents with the age above 60 years accounted for 10 or 3.1% while those in the age of less than 30 years accounted for 8 or 2.5%. The gender of respondents is shown in Table 4.5. The gender was divided into 236 or 74.0% of the respondents are males while 83 or 26.0% are females.

Respondents from UAE university accounted for 192 or 60.2% of the respondents. Higher Colleges of Technology (HCT) accounted for 70 respondents or 21.9% while

those from Zayed University accounted for 57 or 17.9%. The experience of the respondents is shown in Table 4.5. It shows that 237 or 74.3% of the respondents have experience between 3-7 years followed by 39 or 12.2% of the respondents have experience between 8-11 years, 34 or 10.7% have experiences between 12-15 years. Those with experience of less than 3 years accounted for 9 or 2.8% of the respondents.

Position of the respondents is shown in Table 4.5. it shows that 150 or 47.0% of the respondents are lecturers followed by 75 stated others and they are working as top management staff or in managerial position such as deputy of head of departments. Head of departments accounted for 54 or 16.9% followed by deputy dean with 31 or 9.7% and dean with 9 or 2.8%. In terms of academic rank, 49.8% or 159 of the respondents are senior lecturer followed by 23.2% or 74 are assistant professor, 38 or 11.9% identified themselves as lecturers and associate professor while 3.1% or 10 of the respondents were professors.

4.4.2 Descriptive Information of Variables

This section provides the descriptive statistics for the research variables, including both the mean score for each item and the overall mean score. The interpretation of these values follows the guidelines established by Siron and Tasripan (2012) and Qawasmeh, Darqal and Qawasmeh (2013). Table 4.6 presents the mean values alongside their respective interpretations, offering a clear understanding of the data trends within the context of the study.

Table 4. 6: Level and Interpretation of the Mean Score Value

Scale Index	Answer	Answers Level
1-1.49	Strongly Disagree	Very Low
1.5-2.49	Disagree	Low
2.5-3.49	Neutral	Moderate
3.5-4.49	Agree	High
4.5-5	Strongly Agree	Very High

4.4.2.1 Level of Organisational Agility

Table 4.7 depicts the descriptive information of OA. As shown in the Table 4.7, the mean score of OA is 3.64 which indicates that the respondents have high agreement on the statement related to OA. The standard deviation is less than 1.96 indicating that there is similar perspective and view regarding the statement among the respondents. The highest mean score is 3.99 for item OA10 “My organisation has complexity in processes due to increasing number of interdependencies with services of other organisational units” while the lowest mean score is 3.27 for item OA4 “My organisation has necessary changes that take too long even to consider implementing into the association and frameworks like major organisational change (e.g. merger, acquisition)”.

Table 4. 7: Level of Organisational Agility

Item	N	Mean	Std. Deviation
“My organisation has a growing demand for financial transparency and accountability.	319	3.60	.97
My organisation has a new regulation at the national level.	319	3.68	1.01
My organisation has new security measures/IS security.	319	3.66	1.06

My organisation has necessary changes that take too long even to consider implementing into the association and frameworks like major organisational change (e.g. merger, acquisition).	319	3.27	1.25
My organisation has digitalization of archives and e-signatures.	319	3.65	1.03
My organisation has shortening of competitors' time to market new products and services.	319	3.73	1.09
My organisation has increasing customers' loyalty	319	3.74	1.05
My organisation has multichannel requirement whenever or wherever access to data and administrations by clients is required.	319	3.68	1.07
My organisation has speedy reaction needed to administer clients demands.	319	3.98	1.07
My organisation has complexity in processes due to increasing number of interdependencies with services of other organisational units.”	319	3.99	1.02
Overall level of OA	319	3.64	0.84

4.4.2.2 Level of Sustainable Performance

The analysis of SP dimensions—economic performance, environmental performance, and social performance—reflects the perceptions of respondents from public universities in the UAE. Given the unique context of HEI, the findings provide valuable insights into how these public universities are managing their sustainability efforts across key dimensions, such as financial stability, environmental practices, and social impact.

The overall mean score for economic performance is 3.81, indicating a high level of agreement among respondents regarding the financial stability of their public universities. The highest score within this dimension is for the item “The economic performance of your organisation is at an acceptable level in terms of income stability” with a mean score of 3.88, suggesting that respondents perceive their universities as financially stable and able to maintain consistent revenue streams. This is particularly important for public universities, which often rely on government funding and tuition

fees. The lowest score in this dimension, “The economic performance of your organisation is at an acceptable level in terms of profitability” (mean = 3.77), may reflect the non-profit nature of public universities, where profitability is not the primary goal, but financial sustainability remains crucial for continued operations and investments in academic programs and infrastructure.

The environmental performance dimension received a mean score of 3.71, indicating that respondents agree that public universities in the UAE are making efforts to promote environmentally sustainable practices. The highest score within this category is for “Your organisation uses utilities (e.g., energy and water) in an environmentally friendly manner” with a mean score of 3.89, highlighting the importance placed on resource efficiency, particularly in a country like the UAE where environmental conservation, especially water and energy management, is a priority. However, the item “Your organisation is concerned about waste management” received the lowest score in this dimension with a mean of 3.51, suggesting that waste management may be an area where public universities could enhance their efforts. This score reflects that while public universities are prioritising some environmental initiatives, there is room for improvement in how they manage waste, an important aspect of sustainability in institutional settings.

The social performance dimension had an overall mean score of 3.65, showing a high level of agreement that public universities contribute positively to social sustainability. The highest-scoring item, “Your organisation is concerned about child labour use” with a mean of 3.73, reflects the strong ethical stance of public universities in the UAE against exploitative labour practices. This is in line with global social responsibility

standards, and it demonstrates that these institutions are committed to upholding ethical labour practices within their operations. The item “Your organisation improves your empowerment in society” had the lowest mean score in this category, at 3.58, suggesting that respondents feel there is potential for public universities to further enhance their role in empowering individuals and communities, both within and outside the academic environment. Empowerment in this context may relate to providing more opportunities for students and staff to engage in meaningful societal contributions, and to promoting social mobility through education.

The overall mean score for SP across public universities in the UAE is 3.74, indicating that respondents generally agree these institutions are performing well in terms of sustainability. Public universities are perceived to be particularly strong in areas like economic stability and resource efficiency, but there are areas—particularly waste management and social empowerment—that could benefit from increased focus. The results reflect that public universities are aware of their role in promoting sustainability but also highlight the need for continuous improvement, particularly in areas where performance is slightly lower.

Table 4. 8: Level of Sustainable Performance

Items	N	Mean	Std. Deviation
“Economic performance of your organisation is at acceptable level in terms of growth.	319	3.82	.95
Economic performance of your organisation is at acceptable level in terms of income stability.	319	3.88	1.03
Economic performance of your organisation is at acceptable level in terms of return on investment.	319	3.80	.98
Economic performance of your organisation is at acceptable level in terms of profitability.	319	3.77	1.01

Your organisation is providing employment opportunities to you and others.	319	3.81	.95
Mean of Economic Performance	319	3.81	0.81
Your organisation uses utilities (e.g., energy and water) in an environmentally friendly manner.	319	3.89	1.04
Your organisation produces few wastes and emissions.	319	3.85	1.01
Your organisation is concerned about waste management.	319	3.51	1.28
Your organisation uses small space to set up and operate business.	319	3.89	1.01
Your organisation is concerned about hygienic factors.	319	3.45	1.20
Mean of environmental performance	319	3.71	0.89
Your organisation ensures basic needs for your family.	319	3.60	1.14
Your organisation enhances your social recognition in society.	319	3.72	1.16
Your organisation improves your empowerment in society.	319	3.58	1.25
Your organisation provides freedom and control over the course of your own lifestyle.	319	3.66	1.13
Your organisation is concerned about child labor use.”	319	3.73	1.20
Mean of social performance	319	3.65	1.01
Overall mean of Sustainable Performance	319	3.74	0.82

4.4.2.3 Level of KM Process

The descriptive statistics for the KMP in public universities in the UAE, as outlined in Table 4.9, provide important insights into how respondents from these institutions perceive the implementation and effectiveness of KMP. With an overall mean score of 3.87, there is a high level of agreement among respondents, indicating that public universities in the UAE are effectively managing knowledge within their academic and administrative structures. This suggests that these institutions value KMP as an essential mechanism for supporting organisational learning, enhancing decision-making, and promoting innovation—core components for universities that aim to remain competitive and progressive in a dynamic educational landscape.

The highest mean score of 3.94, associated with the item “My organisation members access valuable knowledge from external sources”, reflects the universities' strong focus

on integrating external knowledge into their systems. This highlights the importance placed on collaborating with global academic communities, sourcing cutting-edge research, and staying informed about international best practices. Public universities in the UAE appear to recognise the necessity of external knowledge in enhancing their academic programs, administrative processes, and overall institutional performance. Given the rapid advancements in education technology and research, these institutions must maintain access to external knowledge to foster growth and development in both teaching and research.

Another item with a high mean score is “My organisation members generate new knowledge”, which scored 3.90. This indicates that respondents believe the universities actively encourage knowledge creation. For public universities in the UAE, which are central to the country’s vision of becoming a knowledge-based economy, fostering environments where knowledge is continuously generated is critical. The strong emphasis on knowledge generation aligns with the role these institutions play in contributing to research, innovation, and the overall intellectual development of the country. This focus on creating new knowledge underscores the importance of research and development in public universities and suggests a robust academic culture that promotes intellectual advancement.

The mean scores for other items, such as “My organisation members embed knowledge into processes, products, and/or services” (mean = 3.88) and “My organisation members facilitate knowledge growth through culture and incentive” (mean = 3.87), show a high level of agreement that public universities are effectively embedding and facilitating knowledge growth. This reflects positively on the institutional strategies in place to

ensure that KM is not just about the creation and storage of information but also about its practical application in improving academic and administrative processes. These scores suggest that public universities in the UAE are actively embedding knowledge into their organisational systems, enhancing both the academic environment and the administrative efficiency necessary to support institutional growth.

However, the item “My organisation members use accessible knowledge in decision-making” received a slightly lower mean score of 3.75. While still positive, this indicates that there may be some room for improvement in how effectively public universities are integrating available knowledge into their decision-making processes. Given that decision-making in universities affects a broad range of stakeholders—from students and faculty to administrative staff and external partners—ensuring that knowledge is systematically used to inform these decisions is crucial. Enhancing the use of accessible knowledge in decision-making could further improve the agility and responsiveness of universities to evolving educational demands and societal needs.

Overall, the high mean score of 3.87 for the KMP in public universities in the UAE signifies that these institutions are well-positioned to manage knowledge effectively. Respondents appear to appreciate the systems and strategies in place for knowledge generation, dissemination, and application, which are critical for promoting innovation and organisational growth. However, the slightly lower scores related to knowledge use in decision-making suggest that public universities could focus more on ensuring that knowledge is effectively integrated into all aspects of institutional governance and operational strategies.

Table 4. 9: Level of KM Process

Items	N	Mean	Std. Deviation
“My organisation members generate new knowledge	319	3.90	.82
My organisation members access valuable knowledge from external sources	319	3.94	1.01
My organisation members facilitate knowledge growth through culture and incentive	319	3.87	1.02
My organisation members represent knowledge into documents, databases and software	319	3.84	1.01
My organisation members embed knowledge into processes, products and/or services	319	3.88	1.01
My organisation members use accessible knowledge in decision-making	319	3.75	1.01
My organisation members transfer existing knowledge into other parts of the organisation	319	3.84	1.02
My organisation members measure the value of knowledge assets and/or impact of knowledge management”	319	3.84	1.03
Level of KMP	319	3.87	0.775

4.4.2.4 Level of Technological Innovation

The descriptive statistics presented in Table 4.10 provide insights into the perceived level of TI within the context of public universities in the UAE. The overall mean score of 3.73 indicates a high level of agreement among respondents regarding the implementation and effectiveness of TI within their institutions. This score suggests that public universities in the UAE are actively adopting and utilising technological advancements to improve their operational efficiency, enhance competitiveness, and promote organisational growth. Given the importance of technology in education, particularly in a rapidly evolving environment, the findings reflect positively on the universities' capacity to adapt to new technological trends and innovations.

Breaking down the individual items, the highest mean score of 3.79 is for the statement “The university continues to develop and improves programs”. This high score

highlights the commitment of public universities in the UAE to continuously update and enhance their academic offerings, ensuring that their programs remain relevant and competitive. This is particularly important in HE, where program innovation is essential for meeting the changing demands of students, industry, and society. The focus on improving programs demonstrates the universities' commitment to quality education and their responsiveness to both global trends and local needs.

The item “The university can replace products that are obsolete” also received a high mean score of 3.76, indicating that respondents agree that their universities are proactive in identifying and replacing outdated technologies or practices. This is a critical aspect of TI, as the ability to replace obsolete products or systems ensures that the universities remain at the forefront of technological advancements. This ability not only enhances operational efficiency but also enables the institutions to maintain their competitiveness in the global HE landscape.

Another important item, “The university continues to reduce cost of production”, received a mean score of 3.75. This suggests that respondents perceive their universities as being effective in leveraging technology to reduce operational costs. In the context of public universities, reducing the cost of production is vital for enhancing financial sustainability, particularly when resources are limited or must be managed efficiently. The focus on cost reduction through technology indicates that the universities are using innovation not only to improve educational delivery but also to optimise resource allocation and operational efficiency.

However, the item “The university efficiently integrates production management activities” received a slightly lower mean score of 3.44, indicating that respondents may feel there is room for improvement in how technology is integrated into management activities. While the score still reflects a moderate level of agreement, this lower score suggests that the integration of technological tools in the management of institutional processes could be further enhanced. Effective integration of technology into management activities is essential for streamlining operations, reducing inefficiencies, and ensuring that the benefits of technological advancements are fully realised.

In terms of environmental impact, the item “lower environmental impact” received a mean score of 3.74, indicating that respondents agree that the universities are using TI to reduce their environmental footprint. This aligns with global trends in sustainability, where educational institutions are increasingly adopting green technologies to minimise their impact on the environment. The focus on reducing environmental impact through TI demonstrates the universities' commitment to sustainability, a key priority for many public organisations in the UAE.

The overall mean score of 3.73 for TI reflects a strong consensus among respondents that public universities in the UAE are effectively adopting and utilising technological advancements. This high level of agreement indicates that TI is seen as a driving force for organisational growth, flexibility, and sustainability. The findings suggest that public universities are not only focused on improving educational outcomes but also on integrating technology into their broader operational and management processes to enhance competitiveness and adaptability in a rapidly changing educational landscape.

Table 4. 10: Level of Technological Innovation

Item	N	Mean	Std. Deviation
The university can extend its range of products.	319	3.73	1.08
The university can replace products that are obsolete.	319	3.76	1.23
The university continues to develop and improves programs.	319	3.79	1.10
The university continues to reduce cost of production.	319	3.75	1.15
The university efficiently integrates production management activities.	319	3.44	1.32
Improve organisational flexibility.	319	3.68	1.14
Lower environmental impact.	319	3.74	1.11
Level of technological innovation.	319	3.73	0.919

4.5 Structural Equation Modelling

The structural model assessment in this study is a comprehensive process, divided into two distinct stages to ensure the robustness and reliability of the findings. The first stage focuses on the validation of the measurement model, a crucial step in ensuring that the constructs are measured accurately. This involves assessing key indicators such as factor loadings, reliability measures (CA and Composite Reliability (CR)), and validity assessments, which include both convergent and discriminant validity. Factor loadings are used to confirm the strength of the relationship between observed variables and their underlying latent constructs, where higher loadings indicate a strong association. To ensure internal consistency and reliability, CA and CR are utilised. CA assesses the reliability of the items measuring each construct, while CR offers a more refined evaluation of the reliability of the constructs, ensuring they consistently measure the intended variable. Convergent validity is checked through “Average Variance Extracted” (AVE), which ensures that the constructs correlate well with the indicators they are supposed to measure. Meanwhile, discriminant validity ensures that the constructs are distinct from one another, validating that they measure different concepts within the model.

The second stage involves the validation of the structural model, which examines the relationships between the constructs within the proposed model. This stage focuses on assessing key indicators such as the R-square (R^2), F-square (F^2), and path coefficients. The R^2 value is essential for determining the explanatory power of the model, indicating the amount of variance explained by the independent variables in the dependent variables. A higher R^2 value suggests that the model is well-fitted and has good predictive accuracy. The F^2 value assesses the effect size of each predictor on the dependent variable, helping to understand the relative importance of each construct within the model. Path coefficients, which represent the strength and direction of the relationships between the variables, are evaluated to test the proposed hypotheses. These coefficients indicate the magnitude of influence that one variable has on another and are critical for determining the validity of the structural relationships within the model.

Furthermore, as noted by Hair et al. (2023), researchers are advised against using the Goodness of Fit (GoF) index in the context of Smart PLS, as it differs from how GoF is applied in AMOS. The GoF index has been shown to be less relevant for models estimated using PLS, as it does not adequately capture the complexities of PLS modelling. Additionally, recent updates in Smart PLS 4 have streamlined the model validation process by eliminating the need for testing the Q-square. This change reflects recent methodological advancements, as the Q-square has been found redundant when other comprehensive analyses, such as cross-validated redundancy measures and R^2 values, are conducted. Thus, the structural model validation in this study follows the most current guidelines and best practices to ensure a rigorous assessment of the

relationships between the constructs. Next section presents the empirical validation of measurement and structural models.

4.5.1 Measurement Model Assessment

Hair et al. (2023) recommended that factor loadings below 0.70 should be eliminated. Upon assessment of the measurement model, it was discovered that certain items exhibited a factor loading below the acceptable threshold of 0.70. Based on the measurement model assessment as shown in Figure 4.1, items ENP3 from environmental performance (ENP), item OA4 from OA, and item TI5 from TI were removed because they have loading less than 0.70 as shown and highlighted in red in Figure 4.1. The figure shows the initial measurement model.



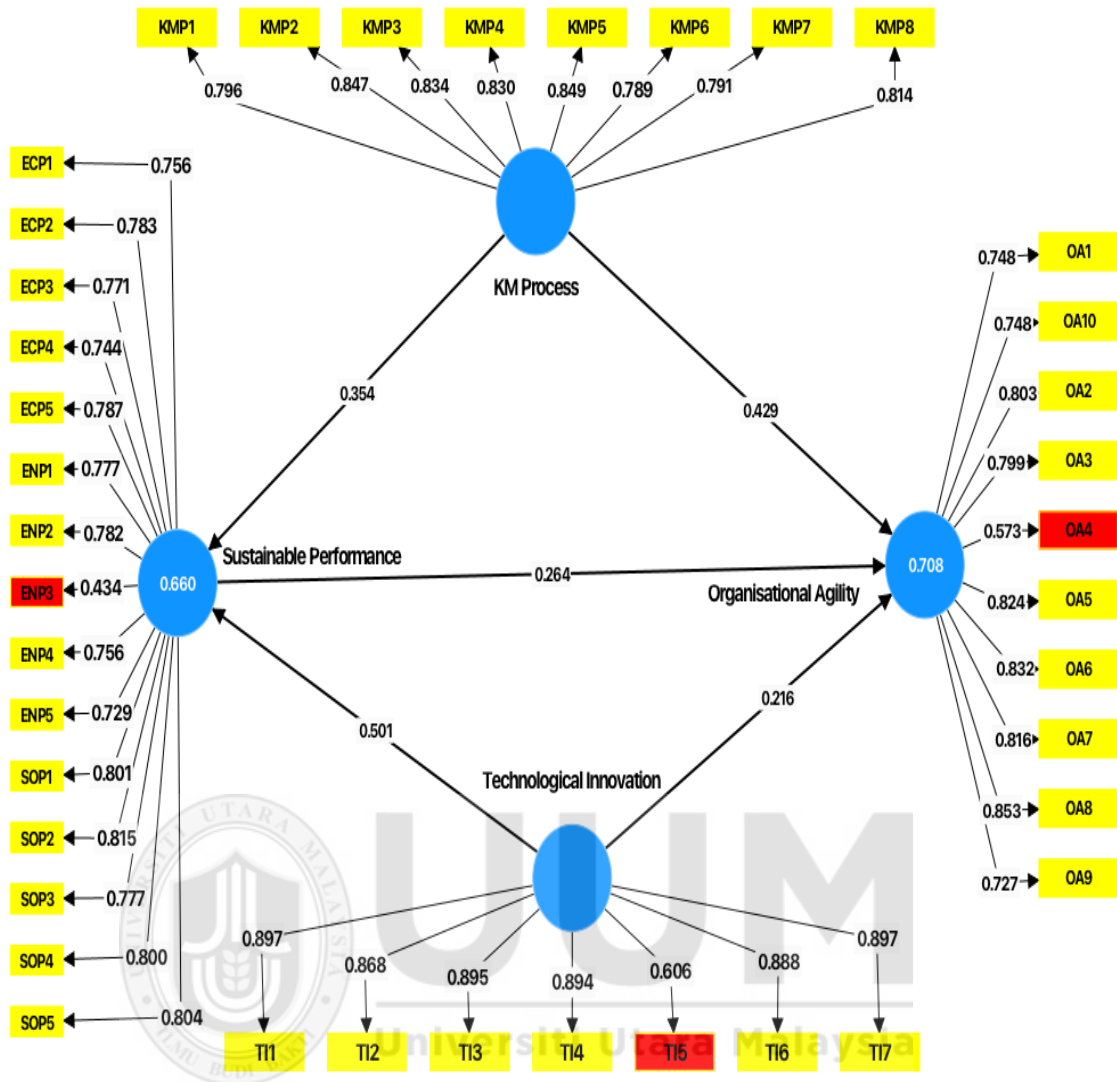


Figure 4. 1: Initial Measurement Model

After removing items that had weak factor loadings, notable improvements were seen in the reliability and validity of the variables. The refinement process was crucial in enhancing the strength and precision of the measurement model. It involved a thorough assessment of the factor loadings assigned to each item. Following the guidelines proposed by Hair et al. (2023), which suggest a minimum factor loading threshold of 0.70, items that did not meet this criterion were systematically excluded from further consideration. This helped to strengthen the overall reliability and validity of the measurement model. Figure 4.2 shows the finalized measurement model.

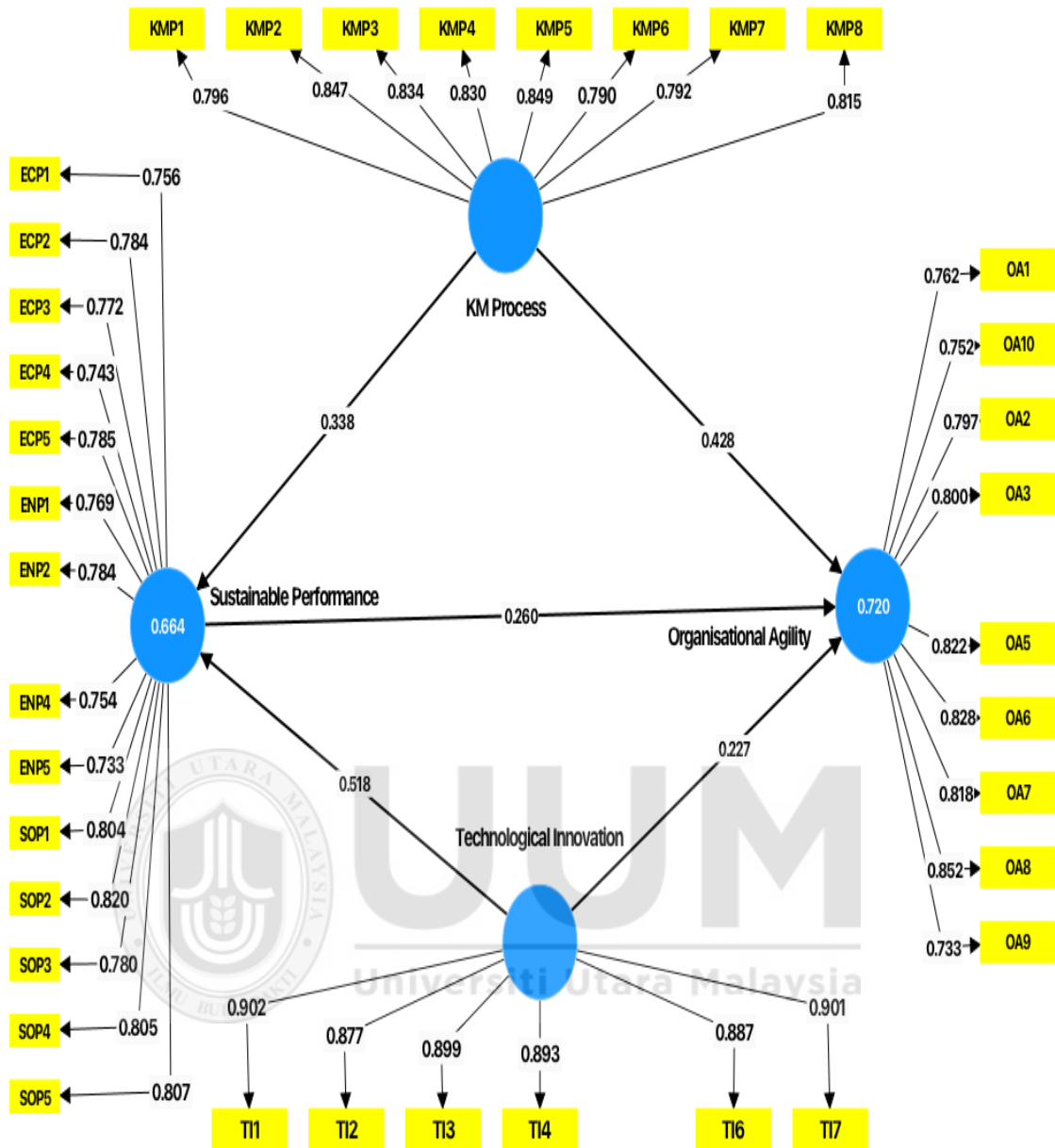


Figure 4. 2: Finalized Measurement Model

After removing the low factor loading, all the items have loading greater than 0.70.

Table 4.11 presents the factor loadings of all the items of the first-order variables.

Table 4. 11: Factor Loading of Variables

	SP	TI	KMP	OA
ECP1	0.756			
ECP2	0.784			
ECP3	0.772			
ECP4	0.743			
ECP5	0.785			
ENP1	0.769			
ENP2	0.784			
ENP4	0.754			
ENP5	0.733			
SOP1	0.804			
SOP2	0.820			
SOP3	0.780			
SOP4	0.805			
SOP5	0.807			
TI1		0.902		
TI2		0.877		
TI3		0.899		
TI4		0.893		
TI6		0.887		
TI7		0.901		
KMP1			0.796	
KMP2			0.847	
KMP3			0.834	
KMP4			0.830	
KMP5			0.849	
KMP6			0.790	
KMP7			0.792	
KMP8			0.815	
OA1				0.762
OA10				0.752
OA2				0.797
OA3				0.800
OA5				0.822
OA6				0.828
OA7				0.818
OA8				0.852
OA9				0.733

Note: OA: Organisational Agility, SP: Sustainable Performance, KMP: Knowledge management process, TI: Technological innovation.

4.5.1.1 Reliabilities

Reliability is a critical aspect of the model assessment, ensuring that the items used to measure a particular construct are consistent and dependable across different respondents. After eliminating items with low factor loadings, the reliability of each construct was evaluated using CA and CR. These two measures are widely used to determine internal consistency within a set of items.

CA is a traditional measure of reliability that assesses how closely related a set of items are as a group. In this study, all CA values exceeded the commonly accepted threshold of 0.70, as suggested by Hair et al. (2023), indicating that the constructs have acceptable internal consistency. For example, the CA for KMP was 0.930, for OA it was 0.928, for SP it was 0.900, and for TI it was 0.909. These high values suggest that the items within each construct are reliably measuring the intended variable, reducing the likelihood of measurement errors.

CR, which provides a more comprehensive evaluation of reliability compared to CA, also yielded values greater than 0.70 for all constructs. CR assesses the overall reliability of the latent construct by accounting for both the factor loadings and measurement errors of the individual items. The CR values for KMP, OA, SP, and TI were similarly strong, further confirming that the constructs were measured consistently across respondents. These findings are significant as they validate the reliability of the measurement model, suggesting that the constructs used in this study are appropriate for capturing the underlying theoretical dimensions of KMP, OA, SP, and TI.

4.5.1.2 Convergent Validity

Convergent validity refers to “the degree to which the items within a construct are correlated and truly measure the same underlying concept” (Hair et al., 2023). This was assessed using the AVE, which indicates the proportion of variance in the observed variables that is attributable to the latent construct. According to Hair et al. (2023), an Average Variance Extracted value of 0.50 or higher is considered acceptable because it means that more than 50% of the variance in the construct is explained by its items.

As shown in Table 4.12, the AVE values for all constructs were greater than 0.50, indicating strong convergent validity. For instance, the AVE for TI was the highest at 0.798, suggesting that the items related to TI were highly correlated and collectively explained a significant portion of the variance in the construct. Similarly, the AVE values for KMP (0.671), OA (0.635), and SP (0.606) demonstrate that the items within these constructs were well-correlated, explaining more than half of the variance in each variable. The high AVE values across all constructs confirm that the measurement items were able to capture the essence of the constructs they were intended to measure, thus validating the convergent validity of the measurement model.

Table 4. 12: Assessment of the Measurement Model

Variable	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
KMP	0.930	0.930	0.671
OA	0.928	0.928	0.635
SP	0.900	0.910	0.606
TI	0.909	0.913	0.798

4.5.1.3 Discriminant Validity

Discriminant validity evaluates whether each construct in a model is unique and distinct from other constructs. In this study, discriminant validity was assessed using three approaches: the Fornell-Larcker Criterion, the Heterotrait-Monotrait (HTMT) ratio, and cross-loadings. The Fornell-Larcker Criterion involves comparing the square root of the AVE for each construct with its correlations with other constructs. To confirm discriminant validity, the square root of the AVE for a construct should exceed its correlations with other constructs, indicating that the construct shares more variance with its own items than with items from different constructs.

Table 4.13 displays these values, with the diagonal elements representing the square root of the AVE for each construct, which are consistently greater than the off-diagonal correlation values. For instance, the square root of the AVE for KMP is 0.819, which is higher than its correlations with OA at 0.507, SP at 0.554, and TI at 0.303. This pattern, observed across all constructs, confirms that each construct is distinct, supporting the model's discriminant validity.

Table 4. 13: Discriminant validity (Fornell-Larcker Criterion)

	KMP	OA	SP	TI
KMP	<u>0.819</u>			
OA	0.507	<u>0.797</u>		
SP	0.554	0.463	<u>0.779</u>	
TI	0.303	0.477	0.39	<u>0.893</u>

The HTMT method examines the correlation between constructs to ensure that they are not overly similar. According to Hair et al. (2019), the HTMT values should be less than 0.85 to confirm discriminant validity. As shown in Table 4.14, all HTMT values are

below 0.85, indicating that the constructs are sufficiently distinct from one another. For example, the HTMT value between KMP and SP was 0.799, and the HTMT value between TI and OA was 0.625, both of which are below the 0.85 threshold. These results provide further evidence that the constructs are not measuring the same underlying concept and can be treated as distinct variables in the structural model.

Table 4. 14: Discriminant validity (HTMT Correlation)

	KMP	OA	SP	TI
KMP	-			
OA	0.566			
SP	0.799	0.608		
TI	0.554	0.625	0.63	-

The final method for assessing discriminant validity is the cross-loading of items. For discriminant validity to be established, an item should load more strongly on its own construct than on any other construct. Table 4.15 shows that the items loaded well on their respective constructs, with higher loadings on the intended variable than on other constructs. For instance, the items measuring KMP had higher loadings on KMP than on any other variable, demonstrating that the items were good indicators of the intended construct.

Table 4. 15: Cross Loading

	SP	KMP	OA	TI
ECP1	0.756	0.683	0.548	0.603
ECP2	0.784	0.667	0.586	0.601
ECP3	0.772	0.688	0.597	0.637
ECP4	0.743	0.646	0.567	0.606
ECP5	0.785	0.615	0.664	0.622
ENP1	0.769	0.594	0.644	0.591
ENP2	0.784	0.556	0.617	0.617
ENP4	0.754	0.602	0.661	0.642
ENP5	0.733	0.443	0.518	0.524
SOP1	0.804	0.555	0.574	0.628
SOP2	0.820	0.541	0.596	0.665
SOP3	0.780	0.530	0.579	0.630
SOP4	0.805	0.536	0.565	0.619
SOP5	0.807	0.531	0.571	0.603
KMP1	0.579	0.796	0.608	0.642
KMP2	0.649	0.847	0.656	0.695
KMP3	0.612	0.834	0.680	0.641
KMP4	0.560	0.830	0.674	0.643
KMP5	0.591	0.849	0.668	0.652
KMP6	0.625	0.790	0.623	0.636
KMP7	0.649	0.792	0.620	0.661
KMP8	0.674	0.815	0.656	0.691
OA1	0.610	0.653	0.762	0.629
OA10	0.636	0.660	0.752	0.613
OA2	0.610	0.633	0.797	0.585
OA3	0.616	0.689	0.800	0.655
OA5	0.559	0.587	0.822	0.583
OA6	0.579	0.614	0.828	0.616
OA7	0.592	0.583	0.818	0.602
OA8	0.624	0.664	0.852	0.649
OA9	0.627	0.680	0.733	0.620
TI1	0.606	0.530	0.693	0.902
TI2	0.698	0.515	0.673	0.877
TI3	0.501	0.516	0.515	0.899
TI4	0.541	0.556	0.612	0.893
TI6	0.690	0.502	0.675	0.887
TI7	0.694	0.684	0.692	0.901

4.5.3 Structural Model

The evaluation of the structural model was based on four key criteria: the R-squared (R^2) value, the F-squared (F^2) effect size, and the path coefficients. Recent updates of Smart PLS 4 suggested that the Q-square is redundant and removed the analysis from the Smart PLS. The following sections present the results of the structural model assessment.

4.5.3.1 R-square

In this study, there are direct effect model and mediating model. However, Smart PLS can examine both models in one model. The value of R-square was examined. As shown in Table 4.16, the R-square for SP is 0.664 and for OA, the R-square is 0.720. This indicates that the KMP and TI can explain 66.4% in SP while KMP, TI and SP can explain 72% of OA. These percentage is high and can be considered substantial.

Table 4. 16: R-square

Model	SP	OA
KMP and TI	0.664	-
KMP, TI, and SP	-	0.720

4.5.3.2 Effect Size (F-square)

This measure indicates the extent to which an exogenous latent variable explains the variance in an endogenous latent variable. According to Cohen's guidelines, effect size (f^2) values are interpreted as follows: 0.02 represents a small effect, 0.15 a medium effect, and 0.35 a large effect. Table 4.17 depicts that most of the variables considered in this study reflected acceptable F-square values (> 0.02). According to Hair et al. (2023), the effect size (F-square) of variables in a structural model should be greater than 0.02 and values less than 0.02 indicate that the related path is not significant. As shown in Table 4.17, all the paths have effect size greater than 0.02.

Table 4. 17: Effect Size

	OA	SP
KMP	0.207	0.121
SP	0.081	-
TI	0.051	0.283

4.6 Hypotheses Testing

The hypothesis of this study was examining based on the output of the structural model.

The direct effect and the mediating effect were tested and shown in Figure 4.3.

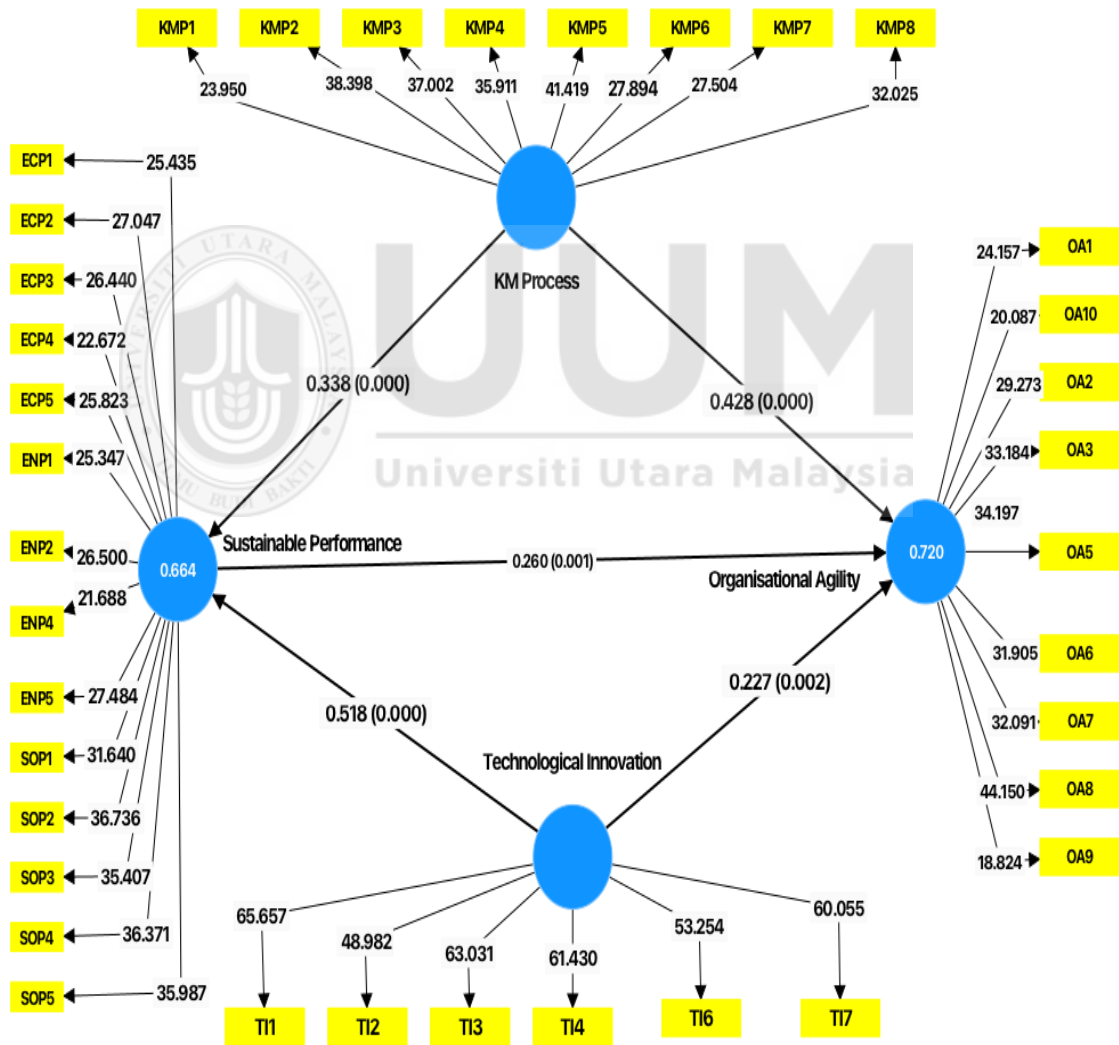


Figure 4. 3: Structural Model

Table 4.18 presents the results of the hypothesis testing, detailing each hypothesis (H), the corresponding path, path coefficient (β), standard deviation (Std. Dev.), T-value (T), and P-value (P).

Table 4. 18: Results of Hypotheses Testing

H	Path	B	Std.	T	P
H1	TI -> SP	0.518	0.071	7.304	0.000
H2	KMP -> SP	0.338	0.077	4.392	0.000
H3	TI -> OA	0.227	0.074	3.069	0.002
H4	KMP -> OA	0.428	0.087	4.931	0.000
H5	SP -> OA	0.26	0.075	3.46	0.001
H6	TI -> SP -> OA	0.135	0.046	2.909	0.004
H7	KMP -> SP -> OA	0.088	0.032	2.746	0.006

4.6.1 Technological Innovation and SP

The first hypothesis (H1) in this study proposed that TI has a positive and significant effect on SP. TI refers to the adoption and utilisation of advanced technologies to improve operational efficiency, innovate processes, and enhance overall performance. The hypothesis was articulated as: "H1: TI has a positive effect on SP." The results in Table 4.18 clearly demonstrate that the path coefficient for the relationship between TI and SP is $B = 0.518$, with a T-value of 7.304 and a P-value less than 0.05, indicating statistical significance. This confirms that the hypothesis is supported, meaning that an increase in the level of TI within universities leads to a notable improvement in SP. This finding is consistent with existing literature, where TI is often linked to enhanced sustainability outcomes by driving improvements in resource management, reducing environmental impact, and fostering social advancements within organisations. The positive effect of TI on SP reflects the growing importance of integrating technology into the strategic initiatives of universities, particularly in areas such as energy efficiency, waste reduction, and overall social responsibility.

4.6.2 KM Process and Sustainable Performance

The second hypothesis (H2) explored the relationship between the KMP and SP, suggesting that the KMP positively influences SP. The hypothesis was stated as: "H2: KMP has a positive effect on SP." The results presented in Table 4.18 indicate that this hypothesis is supported, with a path coefficient of $B = 0.338$, a T-value of 4.392, and a P-value of less than 0.05, confirming statistical significance. The findings suggest that an effective KMP within universities enhances SP. KM fosters innovation, improves decision-making processes, and promotes a culture of continuous learning, which directly impacts the economic, environmental, and social dimensions of SP. By leveraging the collective knowledge of its members, a university can align its operations with sustainability goals, thus contributing to long-term organisational success. This result aligns with prior studies that highlight the crucial role of KMP in improving an organisation's ability to meet sustainability targets, particularly through the efficient use of resources and innovation.

4.6.3 Technological Innovation and Organisational Agility

The third hypothesis (H3) proposed a direct and positive relationship between TI and OA, with the hypothesis stated as: "H3: TO has a positive effect on OA". As shown in Table 4.18, the path coefficient for this relationship is $B = 0.227$, with a T-value of 3.069 and a P-value of less than 0.05, confirming the significance of the relationship. This finding supports the hypothesis that TI enhances OA, enabling universities to adapt to rapid changes, implement innovative solutions, and remain competitive in a dynamic environment. TI facilitates the development of flexible systems and processes that allow institutions to pivot quickly in response to new opportunities or challenges, such as shifts in educational technologies or global disruptions like the COVID-19 pandemic.

The positive impact of TI on OA underscores the necessity for universities to continuously invest in and adopt new technologies to maintain their relevance and effectiveness in an ever-evolving academic landscape.

4.6.4 KM Process and Organisational Agility

The fourth hypothesis (H4) investigated the effect of the KMP on OA, suggesting a positive relationship. The hypothesis was stated as: "H4: KMP has a positive effect on OA". The results shown in Table 4.18 reveal a statistically significant relationship, with a path coefficient of $B = 0.428$, a T-value of 4.931, and a P-value of less than 0.05. These findings support the hypothesis, indicating that an efficient KMP significantly enhances OA. By fostering the effective acquisition, dissemination, and application of knowledge, universities can improve their ability to respond quickly to external changes and remain flexible in their operations. The KMP enables institutions to create a culture of innovation, continuous improvement, and collaboration, all of which are critical for maintaining agility in a rapidly changing environment. This result highlights the importance of knowledge as a strategic asset in driving OA, allowing universities to quickly adjust to new academic, technological, and market demands.

4.6.5 Sustainable Performance and Organisational Agility

The fifth hypothesis (H5) explored the effect of SP on OA, proposing that improved SP leads to greater agility. The hypothesis was stated as: "H5: SP has a positive effect on OA". The results in Table 4.18 demonstrate that this hypothesis is supported, with a path coefficient of $B = 0.260$, a T-value of 3.46, and a P-value of less than 0.05, confirming statistical significance. The findings suggest that universities with high levels of SP—those that excel in economic, environmental, and social dimensions—are

more agile and capable of adapting to external pressures. SP contributes to OA by fostering a culture of responsibility, innovation, and resource optimisation, which enhances the institution's ability to respond to changing conditions and new challenges. By integrating sustainability into their core operations, universities not only meet regulatory and societal expectations but also build a resilient framework that supports agility and long-term success.

4.6.6 Mediating Effect of Sustainable Performance

Mediation is assessed by examining both the direct and indirect effects. According to Hair et al. (2023), when both the direct and indirect effects are significant, partial mediation is indicated. Conversely, if the direct effect is not significant while the indirect effect remains significant, this suggests full mediation. In Smart PLS 4, the structural model output calculates the indirect effect through the 'specific indirect effects' function, allowing for a precise analysis of mediation within the model. This makes the comparison easier and straightforward.

The study also examined the mediating role of SP between TI and OA (H6) and between the KMP and OA (H7). Mediation occurs when a third variable (in this case, SP) explains part or all of the relationship between two other variables. For H6, which proposed that SP mediates the relationship between TI and OA, the results support a partial mediation. Table 4.18 shows that the indirect effect of TI on OA through SP is positive and significant ($B = 0.135$, $T = 2.909$, $P < 0.05$), while the direct effect remains significant. This suggests that TI directly enhances OA but is further strengthened when SP is considered as a mediator. Universities that integrate TI into their sustainability initiatives are likely to see a more pronounced impact on their OA.

Similarly, for H7, which proposed that SP mediates the relationship between the KMP and OA, the results also indicate partial mediation. Table 4.18 reveals a significant indirect effect ($B = 0.088$, $T = 2.746$, $P < 0.05$), along with a significant direct effect of the KMP on OA. This suggests that while the KMP directly enhances agility, SP plays a crucial role in amplifying this effect. By aligning KMP with sustainability goals, universities can achieve greater flexibility and responsiveness.

4.7 Summary

Chapter 4 detailed the analysis and findings of the study, beginning with a thorough data preparation process. This included checking for missing values, outliers, normality, multicollinearity, and non-response bias to ensure data reliability. Responses with significant missing values or identified as outliers were removed, while the remaining data met normality standards and showed no signs of multicollinearity, supporting the robustness of the dataset. Descriptive statistics were then provided for both respondent demographics and research variables, offering a foundational understanding of the sample profile.

Following the initial data assessment, the chapter proceeded with evaluating the measurement and structural models, both of which met the established criteria for validity and reliability, confirming the suitability of the model for hypothesis testing. The hypotheses were tested using Smart PLS 4, with results demonstrating that TI and KMP had a positive and statistically significant impact on both SP and OA. This suggests that advancements in technology and effective knowledge management contribute to the resilience and adaptability of public universities. Furthermore, SP was

shown to positively influence OA, indicating that higher SP enhances an institution's agility.

Additionally, SP was found to mediate the relationships between TI and OA, as well as between KMP and OA, underscoring its critical role in translating technological and knowledge assets into organisational adaptability. This mediating effect emphasizes the importance of SP as a mechanism through which TI and KMP contribute to agility within public universities in the UAE. Overall, these findings highlight the interconnectedness of innovation, knowledge management, and sustainability in driving agility and resilience in higher education institutions, supporting the study's proposed conceptual model and providing valuable insights for both academic and practical applications.



CHAPTER 5

DISCUSSIONS AND CONCLUSION

5.1 Introduction

This chapter is devoted to discussing and elaborating the findings as well as to conclude this study. The chapter consists of six sections. First section provides an outline of the chapter followed by the second section which discusses and explains the findings of this study using inputs from experts' validations. In the third section, the findings of this study are discussed and compared with previous studies. The fourth section elaborates on the theoretical and practical implications of this study. Limitations of the study are highlighted in fourth section while the direction for future works are elaborated in fifth section. Finally, the last section concludes the findings of this study.

5.2 Expert Validations

The validation of results in quantitative research is essential to ensure the accuracy, credibility, and generalisability of findings. Quantitative studies typically rely on statistical techniques to establish relationships between variables, but these results must be validated by subject-matter experts to confirm their practical and theoretical relevance. Expert validation strengthens the integrity of the research, ensuring that the findings reflect the realities of the field and contribute meaningfully to existing knowledge.

One key justification for expert validation is to ensure that the interpretations of statistical results are accurate and aligned with real-world applications. According to Creswell (2014), involving experts helps confirm that the conclusions drawn from the data are not only statistically valid but also meaningful in practice. Experts can assess whether the variables, such as TI and SP, are appropriately measured and if the results are relevant in the specific context of the study. In the case of this study on UAE universities, validation ensures that the findings accurately reflect the role of TI, KMP, and OA in HE.

Another critical aspect of validation is ensuring that the findings are consistent with established theoretical frameworks. Bryman (2016) stresses that expert validation helps confirm whether the results align with key theories, such as the RBV and the KBV, which underpin this study. By reviewing the findings, experts help determine whether the relationships between variables are theoretically coherent, thus enhancing the contribution of the study to the broader academic discourse. In this study, the experts confirmed the alignment of the results with RBV and KBV, reinforcing the study's theoretical foundation.

Validation by experts also addresses the methodological rigor of the research. As noted by Kimberlin and Winterstein (2008), the involvement of experts can help identify any potential biases or weaknesses in the measurement tools, sample size, or statistical analyses. By validating the methodology, experts ensure that the study's design is robust and that the conclusions drawn are reliable. In this study, the experts assessed the adequacy of the sampling methods and statistical procedures, confirming that the

quantitative approach and data analysis techniques were appropriate for examining the relationships between TI, KMP, SP, and OA in UAE universities.

Moreover, expert validation offers practical insights that complement the statistical results. Zikmund et al. (2013) argue that involving experts in the validation process enhances the relevance of the findings by ensuring that the conclusions are applicable in real-world settings. In this study, expert feedback confirmed the practical implications of the results for UAE universities, offering insights into how institutions can leverage TI and KMP to improve sustainability and agility.

In this study, three experts from the three public universities were invited to participate in the validation process of the results. The experts were referred to expert A, expert B, and expert C. The experts were associate professors in the field of management and technology usage. Due to the limited time of the experts, an online validation of the results was used. In the following section, the validation process is discussed.

5.2.1 Validation Process

To ensure the validity and robustness of the study's findings, three experts from key public HEI in the UAE were carefully selected for consultation. The selection of these experts was based on their extensive academic and practical experience in areas related to TI, KMP, OA, and SP in HE. The validation process was conducted in an online format, allowing for flexibility and convenience for the experts. Before the meeting, a comprehensive overview of the study was provided, including the research model, key findings, and the statistical results of the hypotheses being tested. Additionally, a structured set of questions was developed to guide the experts through their evaluation

of the findings. After reviewing the materials, the experts participated in online discussions, where they provided detailed responses to the questions. Below is a synthesis of the personal interviews, reflecting their insights and contributions.

5.2.1.1 Interview with Expert A (Higher Colleges of Technology (HCT))

Question 1: In the study, TI was found to significantly influence SP with a path coefficient of 0.518. From your experience, how does TI contribute to SP in higher education?

Answer 1 (Expert A): *TI has a profound impact on SP, particularly at HCT. For instance, the adoption of smart campus systems that optimise energy usage and reduce carbon emissions is a direct result of technological advancements. Additionally, we have integrated AI tools in administration and teaching, which streamline processes and enhance resource management. These initiatives significantly improve our SP by reducing waste, lowering costs, and promoting more environmentally responsible operations. The path coefficient of 0.518 in the study accurately reflects the substantial role that TI plays in driving sustainability in higher education.*

Question 2: The study also indicates that TI has a direct impact on OA, with a path coefficient of 0.227. How does TI enhance agility in higher educational institution?

Answer 2 (Expert A): *At HCT, TI has been a key enabler of agility, particularly in times of rapid change. One clear example is our swift transition to online learning during the COVID-19 pandemic. Thanks to our investment in digital learning platforms and AI-driven solutions, we were able to move to a fully online education model with minimal*

disruption. Furthermore, the deployment of smart technologies in campus operations, such as automated resource management systems, has allowed us to adapt quickly to operational changes. The path coefficient of 0.227 reflects the importance of TI in enabling institutions like ours to remain flexible and responsive.

Question 3: According to the study, SP mediates the relationship between TI and OA, with a path coefficient of 0.135. From your experience, how does SP amplify the impact of TI on agility?

Answer 3 (Expert A): *SP certainly amplifies the impact of TI on agility. At HCT University, our sustainable practices, such as energy-efficient buildings and digital platforms that minimise resource usage, enable us to redirect funds towards innovative technologies that further enhance our agility. By embedding sustainability into our technological infrastructure, we create a more adaptable and efficient environment. For example, our sustainability-led investments in green IT have allowed us to streamline operations and make faster, more informed decisions, contributing to greater OA. The path coefficient of 0.135 underscores this important mediation effect.*

5.2.1.2 Interview with Expert B (Zayed University)

Question 1: The study found that KMP have a significant impact on SP, with a path coefficient of 0.338. In your opinion, how does KMP contribute to SP at University?

Answer 1 (Expert B): *KMP are instrumental in promoting SP at Zayed University. By leveraging digital platforms that facilitate knowledge sharing among faculty and staff, we ensure that resources are used more efficiently, and best practices are disseminated*

across the institution. For instance, our shift towards paperless administrative systems and cloud-based research databases has not only reduced our environmental footprint but also enhanced the effectiveness of our operations. This aligns with the study's finding that effective KM significantly boosts SP, as reflected by the path coefficient of 0.338.

Question 2: The study suggests that KMP significantly impacts OA, with a path coefficient of 0.428. How important is KMP in fostering agility at universities?

Answer 2 (Expert B): KMP is critical to fostering agility at university. The use of collaborative research platforms and real-time knowledge-sharing systems allows our faculty and staff to respond quickly to new challenges and opportunities. For example, during the pandemic, we were able to adapt our academic programmes for online delivery rapidly, thanks to the robust knowledge-sharing systems we had in place. These platforms facilitated quick decision-making and coordination among departments, enabling us to maintain academic continuity. The significant path coefficient of 0.428 in the study reflects the central role that KMP plays in enhancing agility.

Question 3: The study finds that SP mediates the relationship between KMP and OA, with a path coefficient of 0.088. In your experience, does SP significantly influence the link between KMP and agility?

Answer 3 (Expert B): *SP does indeed strengthen the link between KMP and agility. At Zayed University, our commitment to sustainability is integrated into our KMP, particularly in how we manage resources and share information. For example,*

sustainability-focused research initiatives not only contribute to environmental and social goals but also foster a culture of continuous improvement. This culture of sustainability encourages departments to adapt quickly to changes, making the institution more agile overall. While the path coefficient of 0.088 suggests a modest mediating effect, I believe it accurately reflects the positive influence of sustainability on the agility-enhancing aspects of KMP.

5.2.1.3 Interview with Expert C (United Arab Emirates University)

Question 1: The study indicates that SP significantly influences OA, with a path coefficient of 0.26. How relevant is this relationship in the context of universities?

Answer 1 (Expert C): The relationship between SP and OA is highly relevant at UAE University (UAEU). Our focus on sustainability—through initiatives such as energy-efficient campus infrastructure and environmentally conscious research—has directly contributed to our agility. For example, by reducing operational costs through sustainability initiatives, we have been able to invest in digital technologies that enhance our ability to adapt to new challenges, such as the rapid transition to online learning. The path coefficient of 0.26 accurately reflects the significant role that sustainability plays in making our institution more agile.

Question 2: The study suggests that TI impacts OA directly with a path coefficient of 0.227 and indirectly through SP with a path coefficient of 0.135. In your opinion, how does SP mediate the relationship between TI and agility at universities?

Answer 2 (Expert C): *SP acts as a critical mediator between TI and OA. At UAEU, we have integrated sustainable practices into our TI strategies, which has enhanced our ability to respond flexibly to both internal and external changes. For example, the introduction of smart building systems that monitor energy usage has not only improved our sustainability metrics but also made us more agile by allowing us to optimise resource allocation in real time. By embedding sustainability into our TI, we ensure that our agility is both immediate and sustainable, as reflected by the study's findings.*

Question 3: The study finds that KMP significantly impacts OA with a path coefficient of 0.428, but its mediating effect through SP is lower at 0.088. In your view, does SP play a strong role in linking KMP and agility, or are there other factors that play a larger role?

Answer 3 (Expert C): *While SP does play a role, I would argue that other factors, such as leadership and organisational culture, are equally important in linking KMP to agility. At UAEU, we have seen that strong leadership commitment to knowledge sharing and a culture that promotes innovation have been instrumental in driving agility. However, sustainability is increasingly becoming a key factor, particularly as we align our knowledge management processes with broader environmental and social goals. The lower path coefficient of 0.088 suggests that sustainability is one piece of a larger puzzle, but it is certainly an important one.*

5.2.1.4 Summary of Validation

The validation process involving Expert A, Expert B, and Expert C provided comprehensive support for the study's findings, confirming the relationships explored between TI, KMP, SP, and OA. Drawing from their experiences at HCT University, Zayed University, and UAE University, the experts validated the theoretical framework of the study, offering real-world insights that enhanced the credibility and applicability of the results within the context of UAE HEI. Their feedback reinforced the significance of the variables under study, adding depth and practical relevance to the academic conclusions drawn.

Firstly, all three experts validated the positive relationship between TI and OA. Expert A from HCT emphasized the critical role of digital learning platforms and smart campus technologies in enabling a rapid transition to online education during the COVID-19 pandemic. This adaptation was essential for maintaining academic continuity, demonstrating how TI contributes to agility. Expert B from Zayed University echoed this sentiment, underscoring how technological solutions maintained institutional flexibility during similar transitions. Expert C from UAEU added that smart systems for real-time decision-making and resource management have significantly enhanced operational agility. The collective feedback from the experts confirmed the study's finding that TI significantly contributes to OA, as evidenced by a positive path coefficient of 0.227.

Additionally, the experts agreed on the importance of KMP in fostering OA. Expert B highlighted how Zayed University's knowledge-sharing platforms facilitated quick decision-making during the pandemic, ensuring smooth transitions in academic

programmes. Expert A noted that HCT University's collaborative KM tools have fostered continuous improvement, allowing the institution to adapt quickly to new challenges. Expert C pointed out that although leadership and organisational culture are important, KMP aligned with sustainability initiatives play a crucial role in enhancing agility. The experts' validation reinforces the study's conclusion that KMP positively impacts OA, supported by a path coefficient of 0.428

The experts also validated the positive relationship between TI and SP. Expert A highlighted how smart campus systems and AI-driven solutions at HCT University have improved both operational efficiency and environmental sustainability. By minimising resource usage, the institution has achieved better sustainability outcomes. Expert C from UAEU added that integrating smart resource-monitoring systems has supported long-term sustainability goals, such as reducing environmental impact. These practical examples validate the study's conclusion that TI significantly impacts SP, as shown by a path coefficient of 0.518.

Furthermore, the experts agreed on the positive impact of KMP on SP. Expert B emphasized that Zayed University's use of digital platforms for knowledge sharing, and resource management has led to reduced reliance on physical resources, contributing to environmental sustainability. Expert A from HCT University noted how effective KM strategies have streamlined operations, reducing waste and improving sustainability outcomes in both research and administration. These insights validate the study's finding that KMP positively affect SP, with a path coefficient of 0.338.

In relation to SP as a mediator, all three experts affirmed its mediating role between TI, KM, and OA. Expert A at HCT University discussed how energy-efficient technologies have enhanced both sustainability and agility, creating a more flexible and adaptable institutional environment. Similarly, Expert C from UAEU noted that sustainability initiatives, such as resource optimisation systems, reduce operational costs and improve agility by creating a more resilient organisation. Expert B from Zayed University explained how integrating sustainability into KMP has improved agility by encouraging continuous improvement and efficient resource use. The experts collectively agreed that SP strengthens the positive effects of both TI and KMP on agility, which aligns with the study's findings, showing path coefficients of 0.135 and 0.088, respectively.

The validation process with Expert A, Expert B, and Expert C provided robust confirmation of the study's findings. Their feedback reinforced the relationships between TI, KMP, SP, and OA, while also offering real-world examples from their institutions. The alignment between expert insights and the study's theoretical framework strengthens the overall validity of the research. The experts' validation confirms that TI and KMP are essential drivers of both SP and OA in UAE HEI, contributing to the broader academic understanding of these key organisational factors.

5.3 Discussion

This study was conducted to investigate the effect of TI and KMP on SP and OA. The study also examined the effect of SP on OA as well as the mediating role of SP between TI and KMP, and OA. Specifically, the objective of this study was stated as follows:

1. To examine the effect of TI on SP and OA of public universities in UAE.

2. To investigate the effect of KMP on SP and OA of public universities in UAE.
3. To identify the effect of SP on OA of public universities in UAE.
4. To determine the mediating role of SP, mediate between TI and KMP, and OA of public universities in UAE.

The following sub-sections discuss the findings of this study.

5.3.1 Technological Innovation and Sustainable Performance

A primary objective of this study was to investigate the impact of TI on SP and OA within public universities in the UAE. This section specifically addresses the relationship between TI and SP, as formulated in the study's first hypothesis (H1), which proposed a positive and significant effect of TI on SP. This hypothesis is grounded in the idea that the integration of technological advancements is essential for enhancing sustainability outcomes in HEI. The results derived from the Smart PLS analysis provided strong support for this hypothesis, indicating that TI has a statistically significant and positive impact on SP. With a path coefficient of 0.518, this finding underscores the critical role of TI as a driver of SP. This evidence suggests that continuous investment in technological innovation not only strengthens sustainability efforts but also aligns with the strategic objectives of public universities in the UAE, ultimately contributing to their resilience and competitiveness in an evolving educational landscape.

TI significantly contributes to SP by promoting efficiency, reducing environmental impact, and encouraging the adoption of sustainable practices and materials. In the context of UAE universities, this positive relationship can be attributed to the fact that these institutions serve as hubs for research and development (R&D) in areas such as renewable energy, water conservation, and sustainable construction practices. For

example, advancements in solar power technologies, which are a key focus in UAE universities, play a vital role in reducing reliance on fossil fuels, thus contributing to climate change mitigation. Moreover, innovations in water desalination and recycling technologies help address the critical issue of resource scarcity, promoting sustainable water management. Similarly, the integration of smart building technologies and sustainable construction practices within university campuses demonstrates how technological advancements align with the UAE's national vision for sustainable development.

This finding aligns with the RBV, which argues that organisations can leverage their unique resources—in this case, TI—to enhance their performance. The RBV highlights that TI serves as a strategic asset that allows universities to develop unique capabilities, thus improving their overall SP. The positive effect of TI on SP found in this study is consistent with prior research. For instance, Patil et al. (2016) found that TI fosters sustainable competitive advantages by improving organisational capabilities and resource efficiencies. Similarly, Felipe et al. (2020) demonstrated that IT capabilities positively impact firm performance, especially when moderated by technology intensity and mediated by OA. These studies align with the findings of this research, where universities in the UAE benefit from TI by improving resource management and advancing sustainability initiatives.

The validation of these findings was supported by the input from Expert A from HCT University, Expert B from Zayed University, and Expert C from UAE University. All three experts confirmed that TI is a crucial driver of SP within their institutions. Expert A highlighted that HCT University's investment in AI-driven systems and smart campus

technologies has improved energy efficiency, reduced waste, and contributed significantly to the university's overall sustainability metrics. Similarly, Expert C from UAE University emphasized that the integration of smart systems for resource monitoring has directly supported long-term sustainability goals, particularly by reducing environmental impact. Expert B from Zayed University also pointed out that the university's efforts in leveraging digital platforms and smart technologies have led to improvements in operational efficiency and sustainability outcomes.

Further supporting these findings, Panda and Rath (2018) found that IT capabilities not only improve OA but also positively influence environmental factors, leading to better sustainability outcomes. Their study suggested that TI fosters environmental sustainability by reducing resource consumption and lowering operational costs, thereby contributing to overall organisational performance. Additionally, Mrugalska and Ahmed (2021) emphasized the importance of Industry 4.0 technologies, such as automation, big data analytics, and interconnected systems, in enhancing both operational efficiency and sustainability. In the context of UAE universities, similar technologies—such as AI-driven systems, smart campuses, and digital platforms—have been adopted to improve sustainability by reducing waste and enhancing energy efficiency.

The experts' validation further strengthens the credibility of these findings. Expert A specifically noted how HCT University's smart energy systems have reduced carbon emissions and enhanced the institution's reputation as a leader in sustainable practices. Expert B explained how Zayed University's sustainability-focused initiatives have integrated KM systems to improve resource allocation and operational efficiency.

Expert C highlighted how sustainable construction and the use of green technologies at UAEU have contributed to both the university's environmental goals and its ability to adapt quickly to new sustainability challenges.

In conclusion, the findings of this study, validated by input from the experts, confirm that TI significantly enhances SP in UAE public universities. By adopting advanced technologies, universities are able to reduce their environmental footprint, optimize resource usage, and contribute to the UAE's national sustainability objectives. This reinforces the critical role of TI as a driver of SP in HEI, with significant implications for the broader academic and institutional contexts in the UAE. The combination of academic literature and expert validation provides a comprehensive understanding of how TI impacts SP, making it a key factor in achieving long-term sustainability goals within the higher education sector.

5.3.2 KM Process and Sustainable Performance

The second objective of this study was to investigate the relationship between KMP and SP in public universities in the UAE. The second hypothesis proposed that KMP would have a positive and significant effect on SP. The findings from the Smart Partial Least Squares analysis confirmed this hypothesis, indicating a statistically significant positive relationship between KMP and SP. The path coefficient of 0.338 further illustrates that KMP are an important predictor of SP, reinforcing the notion that activities aimed at improving KMP can directly enhance SP in public universities in the UAE.

The positive effect of KMP on SP can be attributed to several key factors. Respondents in this study indicated that their universities frequently utilise formal procedures to

acquire and manage knowledge from a variety of stakeholders, including employees and external sources. This consistent and structured acquisition of knowledge improves the universities' knowledge capabilities, allowing them to better share and utilize knowledge across departments. As a result, the quality of the knowledge obtained leads to the more effective application of knowledge in decision-making processes, which enhances both operational efficiency and long-term sustainability. In particular, the structured management of knowledge helps universities adopt sustainable practices, ensuring that resources are utilised efficiently, and long-term environmental and social goals are met.

The KBV supports this finding by suggesting that managing organisational knowledge effectively can lead to improved performance outcomes. Although the direct relationship between KMP and SP has been underexplored in the literature, existing research provides ample evidence of the positive influence that KM can have on performance. For instance, Cegarra-Navarro et al. (2016) found a critical association between key KMP elements and firm performance in large companies in Spain. Their study highlights how effective KMP can enhance overall organisational capabilities, which in turn leads to better performance and sustainability outcomes.

Additionally, the findings of this study are consistent with those of Mehdibeigi et al. (2016), who found that customer KM positively influenced organisational effectiveness and agility in Iran's banking sector. Their research suggests that well-managed knowledge processes allow organisations to adapt more effectively to external changes and challenges, thereby enhancing performance. Similarly, Khazaei Pool et al. (2017) identified a significant positive relationship between knowledge sharing and

organisational performance, reinforcing the idea that when knowledge is effectively shared and disseminated within an organisation, it contributes to better performance outcomes, including sustainability.

Tooranloo and Saghafi (2018) also confirmed that companies implementing KMP showed increased flexibility, competence, and responsiveness. These factors are essential for achieving OA, which is closely related to SP, as flexible and responsive organisations are better positioned to adopt sustainable practices. Similarly, Rafi et al. (2022) found that KMP positively influenced business performance, suggesting that structured management of knowledge resources leads to better strategic and operational outcomes, which align with long-term sustainability goals.

The validation from the expert interviews further supports these findings. Expert B from Zayed University emphasised how digital knowledge-sharing platforms and formal KMP have allowed the university to achieve more sustainable outcomes. The expert explained that by using cloud-based systems and other KM tools, Zayed University has been able to reduce resource waste and improve operational efficiency, both of which are critical components of SP. Expert A from HCT University also confirmed that effective KMP have enhanced sustainability practices at their institution, particularly in research and administrative operations, by fostering collaboration and knowledge exchange. Expert C from UAE University highlighted how the integration of KM with sustainability initiatives has created a culture of continuous improvement, thereby contributing to the university's long-term sustainability goals.

In conclusion, both the empirical findings of this study and the validation from experts underscore the importance of KMP in driving SP in public universities in the UAE. The positive relationship between KMP and SP highlights the need for institutions to invest in structured KM systems that not only enhance knowledge sharing and decision-making but also contribute to achieving sustainability goals. This aligns with the broader literature, which suggests that effective KMP is crucial for achieving organisational sustainability and long-term success in a rapidly changing environment.

5.3.3 Technological Innovation and Organisational Agility

The third objective of this study was to examine the influence of TI on OA within public universities in the UAE. This objective was investigated through a hypothesis proposing a positive and significant relationship between TI and OA, suggesting that the integration of advanced technologies plays a vital role in enhancing an institution's ability to adapt swiftly to changing conditions. Results from the Smart Partial Least Squares (PLS) analysis substantiated this hypothesis, indicating that TI significantly contributes to OA, with a path coefficient of 0.227 demonstrating a meaningful association between these variables. This path coefficient reflects the strength of TI as a facilitator of agility, underscoring the importance of technology in fostering responsiveness and flexibility within higher education institutions. These findings are consistent with the broader body of literature, highlighting the role of technological advancements in driving agility. Additionally, they offer specific insights for public universities in the UAE, emphasizing how the strategic implementation of TI can enable these institutions to become more adaptive and resilient in response to the rapidly evolving educational landscape.

The positive effect of TI on OA can be explained by the increasing reliance of universities on digital platforms and advanced technologies to streamline their operations and improve educational delivery. In the context of UAE universities, the adoption of e-learning platforms, digital administrative systems, and advanced research technologies has allowed these institutions to swiftly adapt to emerging trends in education, respond to administrative challenges, and meet the evolving needs of students and faculty. For instance, the rapid transition to online learning during the COVID-19 pandemic is a clear example of how TI has enhanced the agility of universities, allowing them to continue their operations with minimal disruption. This aligns with the RBV which suggests that organisations can leverage their technological resources to achieve superior performance and adaptability.

The validation process involving the experts further reinforced these findings. Expert A from HCT University emphasized the role of digital learning platforms and smart campus technologies in enabling the university to respond quickly to challenges, particularly during times of crisis, such as the COVID-19 pandemic. Similarly, Expert B from Zayed University highlighted how the institution's investments in digital technologies have enhanced its ability to remain flexible and responsive to changing educational needs. Expert C from UAE University also confirmed that TI has played a critical role in improving the university's agility, particularly through the implementation of smart resource management systems that enable real-time decision-making. These insights from the experts validate the study's findings and demonstrate the practical application of TI in enhancing OA.

The relationship between TI and OA has been supported by several studies in various industries and contexts. For example, Zelbst et al. (2011) demonstrated that RFID technology significantly enhances OA, indicating that the adoption of specific TI can improve responsiveness and flexibility within organisations. Similarly, Patil et al. (2016) found that TI broadly enhance OA, suggesting that the adoption of new technologies enables organisations to adapt more quickly to changes and uncertainties. This finding is further supported by Ravichandran (2018), who showed that information systems capabilities and IT investments enhance digital capabilities, which, in turn, positively affect OA. These studies underscore the importance of TI as a key driver of adaptability and flexibility within organisations.

Furthermore, Žitkienė and Deksnys (2018) proposed that dynamic capabilities, which include the ability to integrate, build, and reconfigure internal and external competencies, positively influence OA. This supports the idea that continuous development and application of new technologies foster an environment conducive to agility. Panda and Rath (2018) also identified that IT capabilities specifically impact business process agility and market response agility, further highlighting how technological tools and systems enhance the ability to quickly respond to market demands and operational changes. Similarly, Felipe et al. (2020) confirmed that information systems capabilities positively affect OA, reinforcing the link between technological proficiency and the capacity for adaptation.

In conclusion, both the empirical findings of this study and the validation provided by the experts underscore the importance of TI in driving OA in public universities in the UAE. The adoption of e-learning platforms, digital administrative systems, and

advanced research technologies allows universities to respond more quickly and effectively to changes in the educational environment, ensuring that they remain competitive and adaptable. The alignment between the study's findings and the broader literature further strengthens the conclusion that TI is a critical predictor of OA in HEI, particularly in the context of UAE universities, which are striving to become more agile and responsive to the needs of students, faculty, and the broader community.

5.3.4 KM Process and Organisational Agility

The fourth hypothesis of this study proposed that KMP have a significant and positive effect on OA in public universities in the UAE. The findings supported this hypothesis, confirming that KMP positively influences OA in these institutions. The analysis showed a strong and significant path coefficient, indicating that universities with well-developed KMP are better equipped to respond swiftly to changes, adapt to new challenges, and sustain competitive advantages. This outcome underscores the critical role of KMP in fostering agility, enabling institutions to better manage both academic and administrative knowledge, thereby enhancing their ability to innovate and remain competitive in the dynamic higher education environment of the UAE.

The positive relationship between KMP and OA can be explained by the fact that universities in the UAE are increasingly focused on using their internal knowledge resources to solve emerging problems, manage new educational technologies, and respond to evolving regulatory requirements. When knowledge is effectively captured, stored, and utilized, universities can adapt their operations more swiftly to curriculum changes, student needs, and advancements in teaching methods. This allows them to avoid mistakes, increase efficiency, and remain competitive in an environment

characterized by uncertainty and rapid change. Without efficient use of organisational knowledge, even well-designed KMP will not yield the desired outcomes. Therefore, KM is a key enabler of agility, allowing universities to manage the complexities of higher education and remain responsive to the fast-paced academic landscape in the UAE.

This finding aligns with the KBV of the firm, which posits that managing and leveraging organisational knowledge is essential for enhancing competitiveness and readiness in uncertain environments. The importance of KMP in enhancing OA is well supported by existing literature. For instance, Liu et al. (2014), in their study of the manufacturing, finance, and IT sectors in China, found that KMP capabilities positively influence both operational adjustment agility and market capitalizing agility. Operational adjustment agility refers to an organisation's ability to adjust its internal processes efficiently in response to changes, while market capitalizing agility involves the ability to exploit new market opportunities swiftly. This study illustrates how KMP enhances an organisation's ability to adapt to both internal changes, such as operational shifts, and external challenges, such as new market demands. In the context of UAE universities, this suggests that well-managed KMP enables these institutions to better adjust their academic programs, adopt new teaching technologies, and capitalize on evolving trends in the higher education sector.

Further evidence of this positive relationship is found in the work of Cegarra-Navarro et al. (2016), who studied large companies in Spain and found that knowledge acquisition and conversion processes positively impact firm performance, mediated by OA. Their findings indicate that the benefits of KMP are not only direct but are also

realized through enhanced agility, which allows firms to navigate and succeed in dynamic environments. This is particularly relevant for UAE universities, where adaptability is key to maintaining competitiveness in the face of rapid technological advancements and shifting educational demands. The mediation by OA highlights that the real value of KMP lies in its ability to foster flexibility and responsiveness, allowing institutions to respond proactively to both challenges and opportunities.

The findings of Gyemang and Emeagwali (2020) in Nigeria's telecommunication sector provide further support for the positive relationship between KMP and OA. Their research emphasized that effective KMP are crucial for maintaining agility in rapidly evolving industries. By effectively managing knowledge, organisations can remain flexible, responsive, and competitive in dynamic environments. This is particularly important for UAE universities, which face the dual challenges of keeping up with global trends in education while also addressing local needs and government expectations. The findings of this study confirm that KMP is a crucial driver of OA, enabling universities to adapt to new educational trends, regulatory shifts, and technological advancements.

The validation process further reinforced the importance of KMP in driving OA. Expert B from Zayed University emphasized the role of knowledge-sharing platforms in enabling rapid decision-making and adaptation during times of crisis, such as the COVID-19 pandemic. Expert A from HCT University noted that collaborative tools and continuous improvement initiatives have fostered a culture of adaptability, while Expert C from UAE University highlighted the importance of aligning KMP with sustainability initiatives to enhance agility. These insights confirm the study's findings, showing that

efficient KMP not only enhances OA but also strengthens the institution's overall performance and responsiveness to changes in the academic environment.

In conclusion, the findings of this study, along with the supporting evidence from existing literature and expert validation, confirm that KMP are a critical enabler of OA in public universities in the UAE. By effectively capturing, storing, and utilizing knowledge, universities can become more agile, better equipped to adapt to changes, and more capable of sustaining competitive advantages in the ever-evolving landscape of higher education. This underscores the importance of investing in KM systems as a strategic priority for universities seeking to enhance their agility and overall performance.

5.3.5 Sustainable Performance and Organisational Agility

The fifth hypothesis in this study proposed that SP positively affects OA in public universities in the UAE. The findings of the study supported this hypothesis, revealing that universities that integrate sustainability practices into their operational strategies are better positioned to enhance their agility. Specifically, institutions that adopt sustainable practices, including efficient resource management, environmental responsibility, and social engagement, can respond more flexibly to evolving challenges in the educational sector. This responsiveness enables them to navigate regulatory changes, technological advancements, and shifts in student needs more effectively, ultimately improving their overall performance and competitiveness. The confirmation of this hypothesis highlights the importance of sustainability in fostering an agile institutional culture, especially in public universities that operate within complex and rapidly changing environments.

This relationship between SP and OA is well-supported in the literature. While earlier studies have demonstrated the significance of sustainability for agility across various sectors, the findings of this study align with recent research in organisational contexts. For example, Almahamid et al. (2010) found a positive relationship between knowledge sharing and agility in Jordan's manufacturing sector, emphasizing the role of knowledge-based sustainability in achieving competitive advantage. Similarly, Mehdibeigi et al. (2016) demonstrated that increased OA leads to improved organisational effectiveness, which is essential for achieving sustainability goals. Their findings suggest that sustainable practices not only enhance flexibility but also drive overall institutional performance, further supporting the link between SP and OA.

Studies have also contributed to the growing body of evidence supporting this relationship. Iqbal and Piwovar-Sulej (2022), in a study of HEI in China and Pakistan, emphasized that sustainable leadership and social innovation are critical for enhancing SP and that this performance significantly influences institutional agility. They found that universities that prioritize sustainability through leadership initiatives and innovative practices are more adaptable to external changes, including shifts in educational technologies and regulatory requirements. This aligns with the findings of Sarfraz et al. (2022), who demonstrated that green process and product innovation positively impact agility in the manufacturing sector, allowing firms to respond more efficiently to market dynamics and operational challenges.

Additional insights from Saha et al. (2023) emphasize the increasing importance of SP in fostering OA, particularly in the context of digital transformation and climate change. Their study on digitalisation and sustainability in European universities found that

institutions integrating sustainability into their TI demonstrated a higher capacity for agility and adaptability. This further underscore the growing recognition that SP is not merely an outcome of operational efficiency but a crucial driver of an organisation's ability to remain agile in the face of external disruptions.

The validation process in this study, conducted with Expert A from HCT University, Expert B from Zayed University, and Expert C from UAE University, provided further confirmation of the significant role of SP in enhancing OA. Expert A highlighted that HCT University's sustainability initiatives, such as energy-efficient buildings and smart campus technologies, have directly contributed to increased agility by optimizing resource management and reducing operational costs. These initiatives have enabled the university to reinvest in innovative technologies that further improve its responsiveness to change. Similarly, Expert B from Zayed University noted that the institution's sustainability-driven projects, such as the adoption of eco-friendly administrative practices and socially responsible campus operations, have made it more adaptable to shifts in educational and regulatory landscapes. Expert C emphasized that sustainability efforts at UAE University, particularly in the areas of environmental sustainability and digital transformation, have strengthened the university's ability to pivot quickly in response to global challenges, including the rapid shift to online education during the COVID-19 pandemic.

These expert validations align with the study's hypothesis and further illustrate how SP acts as a catalyst for OA. Universities that embed sustainability into their operational frameworks, whether through energy-efficient practices, socially responsible policies, or innovative academic programs, create a culture of adaptability that allows them to

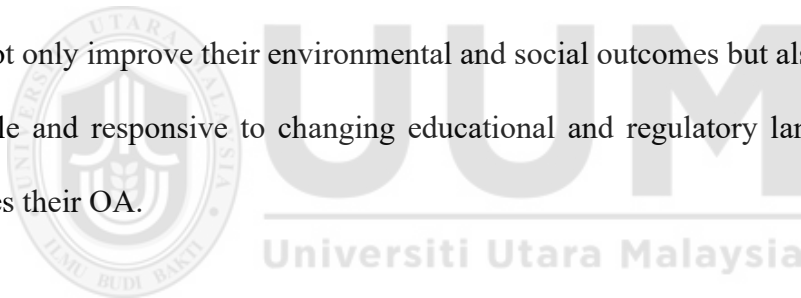
thrive in an increasingly dynamic environment. The experts' real-world examples reinforce the study's findings and underscore the critical importance of sustainability in fostering a flexible, agile, and resilient institutional structure.

Moreover, recent studies such as Asril et al. (2023) and Martínez-Falcó et al. (2024) emphasize that SP—through a combination of green innovation, talent management, and knowledge-sharing practices—can significantly enhance an organisation's capacity for agility. Asril et al. (2023), in their research on the Indonesian manufacturing sector, demonstrated that the alignment of sustainability initiatives with organisational culture and KMP directly contributed to improved agility and performance. Similarly, Martínez-Falcó et al. (2024) found that green innovation and collaborative culture in Spain's wine industry not only improved SP but also fostered greater agility, allowing firms to quickly adapt to market changes and environmental challenges. These studies further confirm that sustainability practices create a foundation for long-term organisational success by enhancing the ability to respond swiftly and effectively to both internal and external changes.

The positive relationship between SP and OA observed in this study is well-supported by recent empirical evidence and validated by industry experts. By integrating sustainability into their core operations, universities in the UAE can enhance their ability to remain agile in the face of evolving educational, technological, and regulatory challenges. This finding contributes to the broader academic discourse on the critical role of sustainability in driving organisational adaptability and highlights the importance of embedding sustainable practices in HEI to foster long-term resilience and success.

5.3.6 Mediating Effect of Sustainable Performance

The sixth and seventh hypotheses of this study examined the mediating effect of SP between TI and KMP on OA. The findings indicate that SP partially mediates the relationship between both TI and KMP with OA, as both the direct and indirect effects were significant. This partial mediation implies that while TI and KMP have a direct impact on OA, the inclusion of sustainability practices further strengthens this relationship. In the context of public universities in the UAE, these findings highlight the importance of integrating SP into operational strategies to enhance institutional agility. Universities that adopt sustainability-driven innovations and foster effective KMP not only improve their environmental and social outcomes but also become more adaptable and responsive to changing educational and regulatory landscapes, which enhances their OA.



The mediating role of SP in this context can be explained by the fact that universities that implement effective KMP are better positioned to advance their knowledge and expertise in sustainability practices. By doing so, they can more effectively meet sustainability goals such as reducing resource consumption, minimising carbon emissions, and improving stakeholder well-being. As these institutions integrate sustainable practices into their KM frameworks, their SP is enhanced, which in turn positively impacts their OA. This improved agility enables universities to swiftly adapt to evolving sustainability demands and external pressures, such as regulatory changes, technological advancements, and shifts in student expectations. Similarly, TI that aligns with sustainability objectives, such as the adoption of green technologies and energy-

efficient practices, not only improves the institution's sustainability outcomes but also enhances its ability to respond more flexibly to external changes, further boosting agility.

The partial mediation observed in the study aligns with previous research, although studies specifically addressing the mediating role of SP are relatively limited. Panda and Rath (2018) explored the role of environmental factors as a moderator between IT capabilities, KMP, and business agility. Their findings indicate that environmental considerations can influence the relationship between technological capabilities and an organisation's ability to respond to market demands. This is consistent with the current study's findings, suggesting that SP can enhance the agility of universities by facilitating environmentally conscious decision-making processes. Similarly, Alipour et al. (2019) investigated the moderating role of green IT acceptance between green university initiatives and sustainable development, concluding that environmentally focused innovations in educational institutions play a pivotal role in shaping sustainability outcomes and, by extension, organisational responsiveness.

Further support for the mediating role of SP comes from Shahzad et al. (2020), who found that green innovation moderated the effect of KMP on corporate sustainability performance. Their findings suggest that innovative practices centred on sustainability not only improve corporate sustainability outcomes but also enhance the effectiveness of KMP. This supports the current study's argument that SP serves as a crucial link between TI, KM, and OA. The study further emphasizes that universities adopting green technologies and sustainable practices through KM initiatives are likely to achieve

greater agility, as they can more effectively respond to environmental challenges and stay ahead of regulatory changes.

Moreover, Sarfraz et al. (2022) provide evidence for the positive impact of green innovation and KM on sustainability performance, with their study demonstrating how sustainability initiatives can enhance an organisation's responsiveness to environmental changes. This aligns with the findings of Iqbal and Piwowar-Sulej (2022), who identified that sustainable leadership and social innovation practices in HEI significantly contribute to SP and subsequently enhance OA. These studies further reinforce the idea that sustainability-driven strategies, whether through TI or KMP, create a foundation for improved organisational flexibility and adaptability, leading to greater agility.

The validation process with experts further confirmed these findings. Expert A from HCT University emphasized that their sustainability-led TI, such as energy-efficient smart campus technologies, not only improved the university's environmental footprint but also strengthened its agility by allowing more efficient resource allocation and quicker decision-making processes. Expert B from Zayed University highlighted the role of sustainability-focused KMP, such as cloud-based platforms and eco-friendly administrative practices, in enhancing the university's responsiveness to regulatory and technological changes. Expert C from UAE University added that the integration of SP into both TI and KM has enabled the university to navigate external pressures, particularly in adapting to global challenges like the rapid shift to online education during the COVID-19 pandemic.

The study's findings, supported by recent literature and expert validation, demonstrate that SP plays a crucial mediating role in the relationship between TI, KMP, and OA. By embedding sustainability into their operational and strategic frameworks, universities in the UAE can enhance their agility, enabling them to adapt more swiftly and effectively to evolving environmental, technological, and educational demands. The integration of sustainable practices not only improves organisational resilience but also drives long-term success in the increasingly dynamic and competitive higher education sector.

5.3 Implications

The subsequent sections provide an in-depth discussion of the theoretical and practical implications of this study, contributing to both scholarly discourse and real-world applications. Theoretically, this research enhances the understanding of the dynamic interplay between KMP, TI, SP, and OA, thereby advancing the literature within the fields of organisational behaviour, strategic management, and higher education studies. These findings extend current theoretical frameworks and offer nuanced perspectives that challenge and refine established understandings. Practically, this study delivers valuable insights for practitioners, policymakers, and university administrators, offering evidence-based recommendations for effectively implementing knowledge management and technological innovation to enhance agility and sustainability. Such guidance is particularly pertinent for leaders seeking to navigate dynamic environments and drive long-term institutional success. Ultimately, these implications underscore the importance of fostering a culture of knowledge-sharing and continuous innovation, aligning organisational practices with sustainable performance objectives.

5.3.1 Theoretical Implication

The study provides a significant theoretical contribution by investigating the relationships among TI, KMP, SP, and OA within the specific context of public universities in the UAE. This research addresses key gaps in the existing literature, offering new insights that enhance the theoretical understanding of these critical concepts. While previous studies have focused on the impact of TI or KMP independently on organisational outcomes, few have explored the simultaneous effects of both variables on SP and OA. By examining the dynamic interactions between TI, KMP, and their influence on SP and OA, this study provides a deeper understanding of how organisations, particularly in the education sector, can leverage technological advancements and effective KM to enhance sustainability and agility. This integrated approach underscores the synergies between technology and knowledge processes, emphasizing their essential roles in modern organisational success.

Traditionally, SP has been discussed in broader contexts, such as environmental sustainability or corporate social responsibility. However, this study shifts the focus to the organisational level, providing a nuanced analysis of how sustainability initiatives directly affect OA. This shift is particularly relevant for developing countries, where achieving sustainability often aligns with developmental goals. In this context, the study reveals that embedding sustainability into an organisation's core strategies significantly enhances adaptability and responsiveness—key characteristics of agile organisations. The findings have profound implications for universities in the UAE and similar

settings, where institutional agility is critical for navigating changes in educational demands, regulatory requirements, and technological advancements.

An important theoretical contribution of this study is its examination of the mediating role of SP between TI, KMP, and OA. This is a relatively unexplored area in the existing body of knowledge. The study demonstrates that SP serves as a crucial mediator, amplifying the impact of both TI and KMP on OA. This finding highlights that sustainability is not merely an end goal but a critical enabler that allows organisations to maximize the benefits of their technological and knowledge assets. As a result, sustainability practices emerge as strategic processes that support broader organisational objectives, enhancing overall responsiveness and flexibility.

The study's focus on the UAE, a rapidly developing country, contributes to the global understanding of sustainability and agility by providing valuable insights into how universities in such contexts can benefit from the integration of these concepts. Much of the existing research on OA and sustainability is centred on developed economies, leaving gaps in the understanding of how institutions in developing countries, such as those in the Middle East, navigate these challenges. By situating the study in the UAE, the research fills this gap, offering a detailed analysis of the unique challenges and opportunities faced by universities in the region. These findings can serve as a guide for policymakers and academic leaders in other developing nations aiming to enhance their educational and organisational systems through sustainability and agility.

Moreover, while the majority of studies on OA and sustainability focus on corporate environments, this research extends the discussion to educational institutions,

particularly public universities in the UAE. The findings provide empirical evidence showing how these institutions can enhance their agility through the adoption of sustainable practices. This extension of the discussion is crucial because universities play a pivotal role in societal development and innovation. Enhancing their agility ensures that they remain responsive to the evolving demands of education, the rapid pace of technological changes, and the societal needs they aim to address. Furthermore, the study's focus on public universities, which differ from private universities in terms of structure, culture, and decision-making processes, contributes to the literature by addressing the specific challenges and opportunities these institutions face in the context of sustainability and agility.

The study also makes a significant contribution by combining the RBV and the KBV to provide a comprehensive theoretical framework for understanding the relationship between SP and OA. The RBV posits that organisations can achieve a competitive advantage through effective resource utilisation, while the KBV emphasizes the strategic value of knowledge as an organisational asset. By integrating these two perspectives, the study offers a robust explanation of how TI and KMP drive SP, which, in turn, enhances OA. This theoretical synthesis bridges the gap between resource management and KM, offering a holistic perspective on achieving organisational excellence.

The validation by Expert A (HCT University), Expert B (Zayed University), and Expert C (UAE University) further reinforced these findings. Expert A highlighted that TI such as smart campus systems significantly contribute to both sustainability and agility by enhancing resource efficiency and decision-making capabilities. Expert B echoed this

sentiment, emphasizing the role of effective KM systems in driving sustainability and agility at Zayed University. Expert C validated the study's findings by noting that sustainable practices, particularly those integrated into technological and KM strategies, have been critical in enhancing the adaptability of UAEU to external challenges, such as the COVID-19 pandemic. These expert insights not only reinforced the study's conclusions but also provided practical examples of how these relationships manifest in real-world settings, thus enhancing the study's credibility and relevance.

This study makes important theoretical contributions by offering a comprehensive framework for understanding the relationships among TI, KMP, SP, and OA in the context of public universities in the UAE. The integration of RBV and KBV perspectives provides a robust theoretical foundation, while the empirical findings offer practical insights for universities aiming to enhance their agility through sustainability and effective resource management. The expert validation further underscores the importance of these relationships, making the study a valuable resource for both academic researchers and practitioners in the field of organisational development and higher education.

5.3.2 Practical Implications

The findings of this study offer several practical implications for decision-makers aiming to enhance the OA and SP of public universities in the UAE. First, the critical role of TI as a predictor of both SP and OA is evident. Universities should prioritise the allocation of resources to upgrade their technological infrastructure. This includes investments in advanced digital tools, software platforms, and technological frameworks that support learning, research, and administrative processes. By adopting

cutting-edge technology, universities can improve operational efficiency, streamline processes, and enhance their ability to adapt to changes in the educational landscape. Furthermore, it is crucial for universities to offer continuous training programs for faculty, staff, and students to ensure they can effectively utilise these new technologies. Training enhances proficiency and ensures that stakeholders can seamlessly integrate these tools into their daily activities, which directly supports both agility and sustainability.

To further enhance OA through TI, universities must adopt flexible and adaptive management practices. These practices enable quick decision-making and responsiveness to change, fostering an environment conducive to innovation. For instance, creating cross-functional teams that collaborate on interdisciplinary projects can accelerate the institution's ability to pivot in response to external changes. Additionally, promoting a culture of innovation within the university will encourage faculty, staff, and students to develop creative solutions and embrace new ways of thinking. In terms of curriculum design, universities should ensure that course content is dynamic and regularly updated to align with industry trends and technological advancements. This proactive approach helps students and faculty stay ahead of the curve, fostering a forward-thinking academic environment that is both agile and responsive.

KMP were also found to be essential for enhancing both SP and OA. Public universities in the UAE should therefore invest in systematic KM initiatives to capture, store, and disseminate knowledge effectively. For example, establishing digital repositories that store valuable research data and organisational knowledge ensures that critical

information is accessible and easily retrievable. Universities should also promote regular seminars and create online collaborative platforms to facilitate the exchange of knowledge among faculty, students, and industry partners. This will not only enhance knowledge sharing but also drive innovation and agility. Additionally, integrating sustainability into strategic planning, such as implementing green campus initiatives or conducting interdisciplinary research on environmental challenges, can significantly boost SP. By adopting such sustainable practices, universities align their goals with broader global sustainability objectives while also ensuring they remain agile and capable of adapting to changing societal and environmental needs.

To sustain and further improve their OA, public universities in the UAE should consider adopting agile management practices, including adaptive leadership training and continuous improvement techniques. These practices ensure that institutions remain dynamic, responsive, and open to changes in the educational environment. For instance, investing in advanced digital tools like e-learning platforms and KM systems can significantly improve the efficiency and effectiveness of knowledge sharing, which in turn enhances organisational responsiveness. Establishing a culture of knowledge sharing through incentives and developing communities of practice can further drive collaboration and foster an environment that promotes both innovation and agility. Additionally, forming partnerships with industry leaders and other academic institutions can provide universities with access to valuable resources and expertise, reinforcing their KM capabilities and improving overall performance.

The study also highlights the positive impact of SP on OA, which suggests that public universities in the UAE can enhance their agility by embedding sustainability into their

core strategies. For example, implementing green campus initiatives that focus on sustainable building designs, energy management systems, and the use of renewable energy sources can improve the university's environmental sustainability while also increasing its flexibility to adapt to regulatory changes. Universities should also encourage interdisciplinary research focused on sustainability and form partnerships with industry and government agencies to leverage expertise and resources that can further enhance their adaptability. Investing in sustainable technologies that improve operational efficiency, such as energy management systems or expanding digital learning platforms, will not only reduce costs but also increase the institution's ability to respond to external challenges.

Policymakers and educational administrators can use the findings of this study to implement reforms that promote sustainability and agility in public universities. This could include revising curricula to ensure sustainability education is embedded across various disciplines, investing in sustainable campus infrastructure, and encouraging research and development in sustainability-related fields. These efforts will help universities align with global sustainability goals while ensuring they remain agile and responsive to evolving educational and societal needs.

Furthermore, the insights derived from this study can be adapted to the specific needs and challenges faced by developing countries. Universities in the UAE and similar contexts can create tailored strategies that leverage local resources and capabilities while maintaining alignment with global sustainability goals. This localised approach ensures that sustainability initiatives are contextually relevant and are more likely to succeed, given the specific socio-economic and environmental conditions of the region.

By adopting such context-specific strategies, universities in developing countries can enhance both their sustainability and OA, enabling them to remain competitive on a global scale while addressing local challenges.

The experts' validation further reinforced these practical implications. Expert A emphasized the need for ongoing technological advancements and training to boost OA at HCT University, while Expert B highlighted the role of KM in fostering collaboration and innovation at Zayed University. Expert C from UAE University supported the integration of sustainable practices in both technology and KM as critical for enhancing agility and ensuring long-term sustainability. These expert insights provide practical examples of how universities can implement the study's recommendations, thereby ensuring the successful application of TI, KMP, and SP to improve OA and sustainability in the higher education sector.

5.4 Limitations

While this study offers substantial contributions and valuable insights, several limitations must be acknowledged to contextualize its findings and inform directions for future research. One primary limitation is the study's specific focus on public universities within the UAE. Although the findings provide meaningful insights that may be relevant to institutions in similar contexts, the generalizability of the results may be constrained when applied to universities in other regions or countries that operate within distinct socio-economic, cultural, and educational frameworks. The UAE's HE sector is characterized by unique features, including its rapid development, substantial governmental support, and strategic emphasis on technological innovation. These factors may differentiate the UAE from more established or less rapidly evolving

educational systems, potentially limiting the applicability of the findings to such settings. Consequently, researchers should exercise caution in extending these results to universities in contexts with different developmental stages or institutional priorities.

This study is specifically confined to the HE sector, which may limit the direct applicability of its findings to other industries, such as healthcare, manufacturing, or service sectors. Each of these industries operates under unique conditions and regulatory frameworks that shape their approach to TI, KMP, and sustainability practices. For instance, the healthcare sector is subject to stringent regulations and privacy considerations, which may impact how TI and KMP are implemented and how these factors contribute to OA. In manufacturing, agility might be influenced by supply chain dynamics, production technologies, and lean management practices, which differ significantly from the academic environment. Similarly, the service sector's emphasis on customer experience, rapid response to market trends, and flexibility in service delivery may shape the role of TI and KMP differently, potentially leading to unique impacts on OA. As such, the dynamics between TI, KMP, sustainability, and OA observed in the HE sector may not fully translate to these sectors.

The study employs a cross-sectional design, capturing data at a single point in time. This approach limits the ability to infer causal relationships between variables. While the study incorporates key variables such as TI, KMP, SP, and OA, other potentially influential factors are not considered. Variables such as organisational culture, leadership styles, external environmental factors, and government policies might also play significant roles in shaping OA and sustainability outcomes.

While this study investigates the mediating role of SP in the relationships between TI, KMP, and OA, it does not examine other potential mediating or moderating variables that may further influence these relationships. For instance, variables such as organisational culture, leadership style, or employee engagement could potentially shape how TI and KMP impact OA, offering additional layers of insight into the mechanisms that drive agility in higher education institutions. Additionally, environmental factors such as regulatory pressures, technological infrastructure, and market dynamics could act as moderators, influencing the strength or direction of these relationships.

Moreover, this study is based on the perspectives of managerial staff, which inherently limits the findings to their specific perceptions and experiences. Since managerial viewpoints may differ from those of other stakeholders—such as faculty members, administrative staff, and students—the findings may not fully capture the diverse range of insights that could enrich the understanding of TI, KMP, and OA within universities.

5.5 Direction of Future Research

In light of this study's limitations and the insights gained from existing literature, several directions for future research are proposed to deepen the understanding of SP and OA. First, given the UAE-based context of this study, future research could expand by investigating SP and OA in universities across different geographic regions, particularly within the GCC and other Middle Eastern countries. This cross-regional approach would offer comparative insights into how cultural, economic, and policy differences influence SP and OA outcomes, thereby contributing to a more globally representative understanding of these constructs in HE.

Second, this study's focus on public universities restricts the applicability of findings to other sectors. Future studies might extend this research by exploring SP and OA within a variety of industries, including manufacturing, service, and private educational institutions, where distinct operational dynamics, regulatory frameworks, and market demands may alter the impact of TI and KMP on sustainability and agility. Sector-specific research would uncover unique contextual factors that shape SP and OA in different organisational environments, thereby enhancing the generalizability of findings across industries.

Third, as this study utilized a quantitative research design, future research could adopt a mixed-methods approach that integrates both quantitative and qualitative methods. This approach would provide a more nuanced understanding of the relationships among variables, capturing both the breadth and depth of data. For example, combining surveys with qualitative interviews or case studies could yield rich, context-specific insights into the experiences and perceptions of stakeholders. Additionally, conducting focus groups with industry experts would enable researchers to gather in-depth perspectives on the predictors and challenges associated with SP and OA in various sectors, thereby enhancing the interpretive depth of the findings.

Moreover, while this study focused on TI and KMP as predictors of SP and OA, future research could incorporate additional variables such as organisational culture, leadership style, external environmental factors, and government policies. These elements are likely to play a significant role in shaping how organisations adopt agility and sustainability practices. For instance, organisational culture and leadership may drive or hinder innovation and adaptation, while government policies and external

factors may serve as either facilitators or barriers to achieving OA and SP objectives. Incorporating these variables would offer a more comprehensive model, capturing the multifaceted influences on SP and OA.

Finally, exploring additional mediators and moderators could provide further insights into the complexity of these relationships. Future studies might consider mediators such as government support, digitalization level, and available resources, which could clarify how external factors enhance the effectiveness of TI and KMP in driving SP and OA. Moderating factors, including environmental uncertainty and market volatility, could offer insights into how different organisational and environmental contexts impact the resilience of SP and OA initiatives. By examining these additional constructs, future research could develop a more sophisticated understanding of how diverse factors interact to influence organisational agility and sustainability across varied settings.

5.5 Conclusion

This study was conducted to examine the effect of TI and KMP on SP and OA. The study also examined the mediating role of SP. This study has provided significant insights into the relationships between TI, KMP, SP, and OA within the context of universities in the UAE. By integrating the RBV and KBV, this research offers a comprehensive framework to understand how universities can leverage their technological and knowledge assets to achieve greater sustainability and agility.

The findings highlighted the positive impact of TI and KMP on enhancing SP, which in turn significantly improves OA. This highlights the critical role of sustainability practices as both a strategic objective and a mediating factor that enhances the overall

effectiveness of technological and knowledge initiatives. The study's results confirm that universities that strategically implement sustainable practices not only meet environmental and social goals but also achieve heightened responsiveness and adaptability in a rapidly changing educational landscape.

Furthermore, this research contributes to the limited body of literature exploring SP and OA in developing countries, providing empirical evidence that can guide policymakers and educational administrators in similar contexts. The insights gained from this study emphasize the importance of integrating sustainability into organisational strategies to foster long-term agility and performance.



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Appendix A: Questionnaire

Questionnaire of Organizational Agility among public universities in UAE.

Dear Participants Greetings

I am a PhD student at Universiti Utara Malaysia, my supervisor and I are working on research to examine the organisational agility of public universities in UAE. The study examines variables such as knowledge management process, technological innovation, and sustainable performance. Information about these variables can be obtained from a middle manager. Therefore, since you fit in this category, we would like to ask for your kind support in participating in this study. The questionnaire aims to collect information and presents results that can help in improving the organisational agility. The data is collected for research and academic purposes and no personal information will be collected. The time estimated to answer this questionnaire is 15-20 minutes.

We highly appreciate your kind help and effort in fulfilling this research endeavour.

Thank you very much for your time and effort.

For any question regarding the questionnaire, please contact us by using the following details:

Student Name: Saleh Mohammed Al-Kaabi



استبيان المرونة التنظيمية بين الجامعات الحكومية في دولة الإمارات العربية المتحدة.

عزيزي المشاركين
تحياتي

أنا طالب دكتوراه في جامعة أوتارا ماليزيا، وأعمل أنا ومشرفي على إجراء بحث لفحص المرونة التنظيمية للجامعات الحكومية في الإمارات العربية المتحدة. وتتناول الدراسة متغيرات مثل عملية إدارة المعرفة، والابتكار التكنولوجي، والأداء المستدام. يمكن الحصول على معلومات حول هذه المتغيرات من المدير الأوسط. لذلك، نظرًا لأنك تنتمي إلى هذه الفئة، نود أن نطلب دعمك الكريم للمشاركة في هذه الدراسة. يهدف الاستبيان إلى جمع المعلومات وتقديم النتائج التي يمكن أن تساعد في تحسين خفة الحركة التنظيمية. يتم جمع البيانات لأغراض بحثية وأكاديمية ولن يتم جمع أي معلومات شخصية. الوقت المقدر للإجابة على هذا الاستبيان هو 15-20 دقيقة.

نحن نقدر بشدة مساعدتكم الكريمة وجهودكم في إنجاز هذا المسعى البحثي.

شكرا جزيلًا على وقتكم وجهدكم.

لأي سؤال بخصوص الاستبيان، يرجى التواصل معنا عبر البيانات التالية:

اسم الطالب: صالح محمد الكعبي

Part A: Background of the Respondents

Please answer the following questions by ticking the appropriate answer.

What is your age?

- Less than 30 years
- 30-40 years
- 41-50 years
- 51-60 years
- Above 60 years

What is your gender?

- Male
- Female

In which university, you are employed?

- Please specify

How long have you been working for this university?

- Less than 3 years
- 3-7 years
- 8-11 years
- 12-15 years
- 16-19 years
- 20 years or above.

What is your position?

- Head of department
- Deputy dean
- Dean
- Lecturer
- Other (Please specify)

What is your academic rank?

- Lecturer
- Senior Lecturer
- Assistant Professor
- Associate Professor
- Professor

Section B: Variables of the Study

Please answer the following questions where:

- (1) Strongly disagree (SD).
- (2) Disagree (D)
- (3) Neutral (N)
- (4) Agree (A)
- (5) Strongly agree (SA).

الجزء أ: خلفية المستجيبين
يرجى الإجابة على الأسئلة التالية بوضع علامة على الإجابة المناسبة.

ما هو عمرك؟

- أقل من 30 سنة
- 30-40 سنة
- 41-50 سنة
- 51-60 سنة
- فوق 60 سنة

ما هو جنسك؟

- ذكر
- أنثى

في أي جامعة تلتحقين؟

يرجى التحديد

منذ متى وأنت تعمل في هذه الجامعة؟

- أقل من 3 سنوات
- 3-7 سنوات
- 8-11 سنة
- 12-15 سنة
- 16-19 سنة
- 20 سنة فما فوق.

ما هو موقفك؟

- رئيس القسم
- نائب العميد
- عميد
- محاضر
- أخرى (يرجى التحديد)

ما هي رتبته الأكاديمية؟

- محاضر
- محاضر كبير
- أستاذ مساعد
- أستاذ مشارك
- أستاذ

القسم ب: متغيرات الدراسة
الرجاء الإجابة على الأسئلة التالية حيث:

- لا أوافق بشدة.
- غير موافق
- محايد
- موافق
- أوافق بشدة.



UUM
Universiti Utara Malaysia

Organisational Agility (Rafi et al., 2022)

Statement	1	2	3	4	5
My organisation has a growing demand for financial transparency and accountability.					
My organisation has a new regulation at the national level.					
My organisation has new security measures/IS security.					
My organisation has necessary changes that take too long even to consider implementing into the association and frameworks like major organisational change (e.g. merger, acquisition).					
My organisation has digitalization of archives and e-signatures.					
My organisation has shortening of competitors' time to market new products and services.					
My organisation has increasing customers' loyalty					
My organisation has multichannel requirement whenever or wherever access to data and administrations by clients is required.					
My organisation has speedy reaction needed to administer clients demands.					
My organisation has complexity in processes due to increasing number of interdependencies with services of other organisational units.					

المرونة التنظيمية
تحتاج مؤسستي إلى الشفافية والمساءلة المالية بشكل متزايد.
تحتاج مؤسستي إلى لائحة جديدة على المستوى الوطني.
تحتاج مؤسستي إلى تدابير أمنية جديدة/أمن نظم المعلومات.
تحتاج مؤسستي إلى تغييرات ضرورية تستغرق وقتًا طويلاً حتى يتم التفكير في تنفيذها في الجمعيات والأطر مثل التغيير التنظيمي الرئيسي (مثل الاندماج والاستحواذ).
تحتاج مؤسستي إلى رقمته الأرشيفات والتوقعات الإلكترونية.
تحتاج مؤسستي إلى تقصير وقت المنافسين لتسويق منتجات وخدمات جديدة.
تحتاج مؤسستي إلى زيادة ولاء العملاء.
تحتاج مؤسستي إلى قنوات متعددة متى وأينما كان الوصول إلى البيانات والإدارات من قبل العملاء مطلوبًا.
تحتاج مؤسستي إلى رد فعل سريع لإدارة مطالب العملاء.
تعاني مؤسستي من تعقيد في العمليات بسبب زيادة عدد الترابطات مع خدمات الوحدات التنظيمية الأخرى.

Sustainable Performance (Iqbal & Ahmad, 2021)

Economic Performance	SD	D	N	A	SA
1. Economic performance of your organisation is at acceptable level in terms of sales growth.					
2. Economic performance of your organisation is at acceptable level in terms of income stability.					
3. Economic performance of your organisation is at acceptable level in terms of return on investment.					
4. Economic performance of your organisation is at acceptable level in terms of profitability.					
5. Your organisation is providing employment opportunities to you and others.					
Environmental Performance					
1. Your organisation uses utilities (e.g., energy and water) in an environmentally friendly manner.					

2. Your organisation produces few wastes and emissions.					
3. Your organisation is concerned about waste management.					
4. Your organisation uses small space to set up and operate business.					
5. Your organisation is concerned about hygienic factors.					
Social Performance					
1. Your organisation ensures basic needs for your family.					
2. Your organisation enhances your social recognition in society.					
3. Your organisation improves your empowerment in society.					
4. Your organisation provides freedom and control over the course of your own lifestyle.					
5. Your organisation is concerned about child labor use.					

الأداء المستدام					
الأداء الاقتصادي					
الأداء الاقتصادي لمنظمتك عند مستوى مقبول من حيث نمو المبيعات.					
الأداء الاقتصادي لمنظمتك عند مستوى مقبول من حيث استقرار الدخل.					
الأداء الاقتصادي لمنظمتك عند مستوى مقبول من حيث العائد على الاستثمار.					
الأداء الاقتصادي لمنظمتك عند مستوى مقبول من حيث الربحية.					
توفر منظمتك فرص عمل لك وللآخرين.					
الأداء البيئي					
تستخدم منظمتك المرافق (مثل الطاقة والمياه) بطريقة صديقة للبيئة.					
تنتج منظمتك القليل من النفايات والانبعاثات.					
تهتم منظمتك بإدارة النفايات.					
تستخدم منظمتك مساحة صغيرة لإنشاء وتشغيل الأعمال.					
تهتم منظمتك بالعوامل الصحية.					
الأداء الاجتماعي					
تضمن منظمتك الاحتياجات الأساسية لعائلتك.					
تعمل مؤسستك على تعزيز الاعتراف الاجتماعي بك في المجتمع.					
تعمل مؤسستك على تحسين تمكينك في المجتمع.					
توفر مؤسستك الحرية والسيطرة على مسار حياتك الخاصة.					
تهتم مؤسستك باستغلال عمالة الأطفال.					

Knowledge Management Process (Rafi et al., 2022)

1. My organisation members generate new knowledge					
2. My organisation members access valuable knowledge from external sources					
3. My organisation members facilitate knowledge growth through culture and incentive					
4. My organisation members represent knowledge into documents, databases and software					
5. My organisation members embed knowledge into processes, products and/or services					
6. My organisation members use accessible knowledge in decision-making					
7. My organisation members transfer existing knowledge into other parts of the organisation					

8. My organisation members measure the value of knowledge assets and/or impact of knowledge management						
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عملية إدارة المعرفة
يقوم أعضاء مؤسستي بتوليد معرفة جديدة
يحصل أعضاء مؤسستي على معرفة قيمة من مصادر خارجية
يسهل أعضاء مؤسستي نمو المعرفة من خلال الثقافة والحوافز
يمثل أعضاء مؤسستي المعرفة في المستندات وقواعد البيانات والبرامج
يتم دمج أعضاء مؤسستي المعرفة في العمليات والمنتجات و/أو الخدمات
يستخدم أعضاء مؤسستي المعرفة المتاحة في صنع القرار
ينقل أعضاء مؤسستي المعرفة الموجودة إلى أجزاء أخرى من المؤسسة
يقيس أعضاء مؤسستي قيمة أصول المعرفة و/أو تأثير إدارة المعرفة

Technological innovation (Donbesuur et al., 2020)

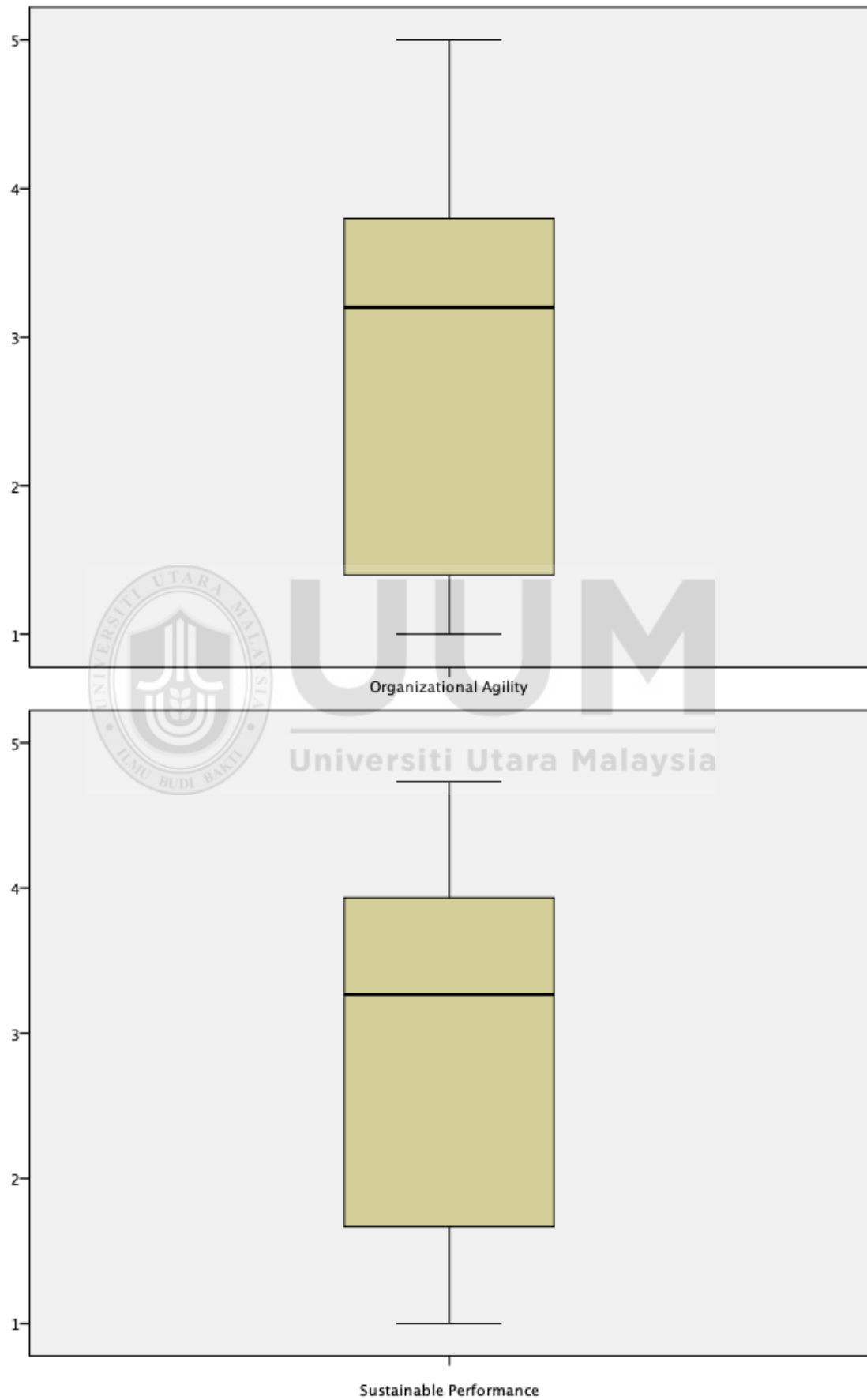
Statement					
The university can extend its range of products.					
The university can replace products that are obsolete.					
The university continues to develop and improves programs.					
The university continues to reduce cost of production.					
The university efficiently integrates production management activities.					
Improve organizational flexibility.					
Lower environmental impact.					

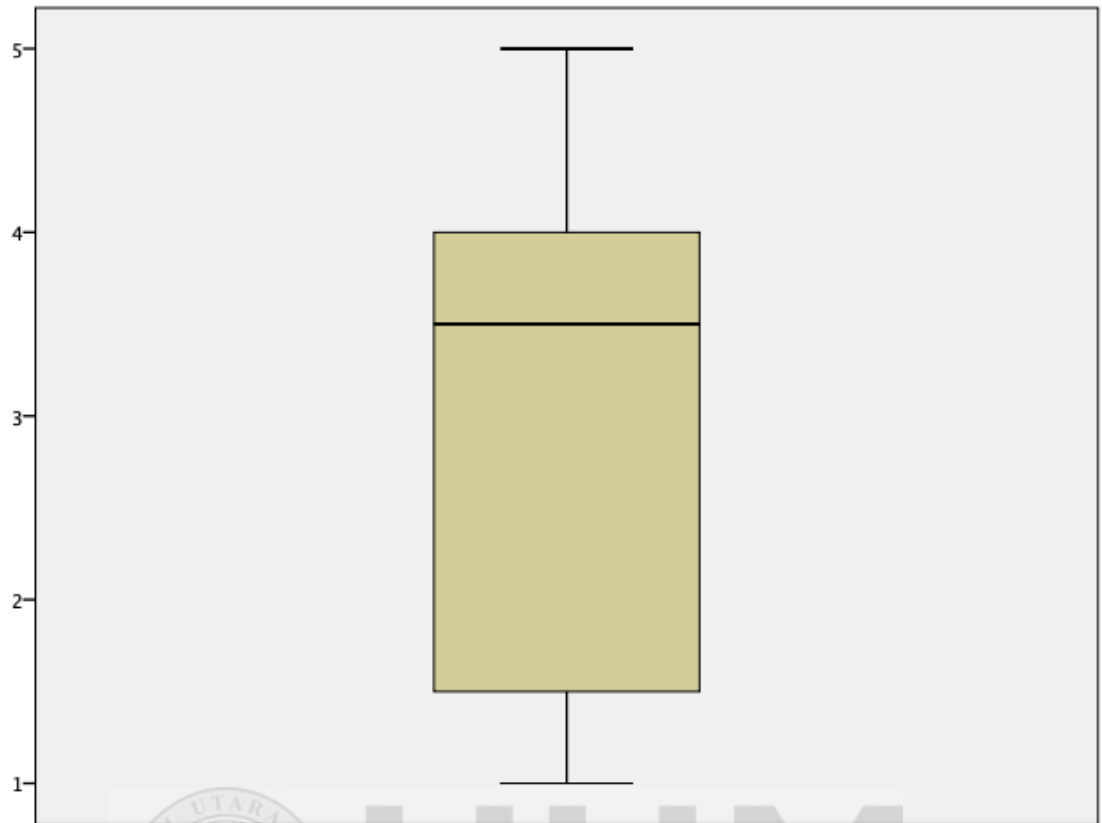
**End of the questionnaire
Thank you very much.**

الابتكار التكنولوجي
يمكن للجامعة توسيع نطاق منتجاتها.
يمكن للجامعة استبدال المنتجات التي عفا عليها الزمن.
تواصل الجامعة تطوير البرامج وتحسينها.
تواصل الجامعة خفض تكلفة الإنتاج.
تدمج الجامعة أنشطة إدارة الإنتاج بكفاءة.
تحسين المرونة التنظيمية.
خفض التأثير البيئي.

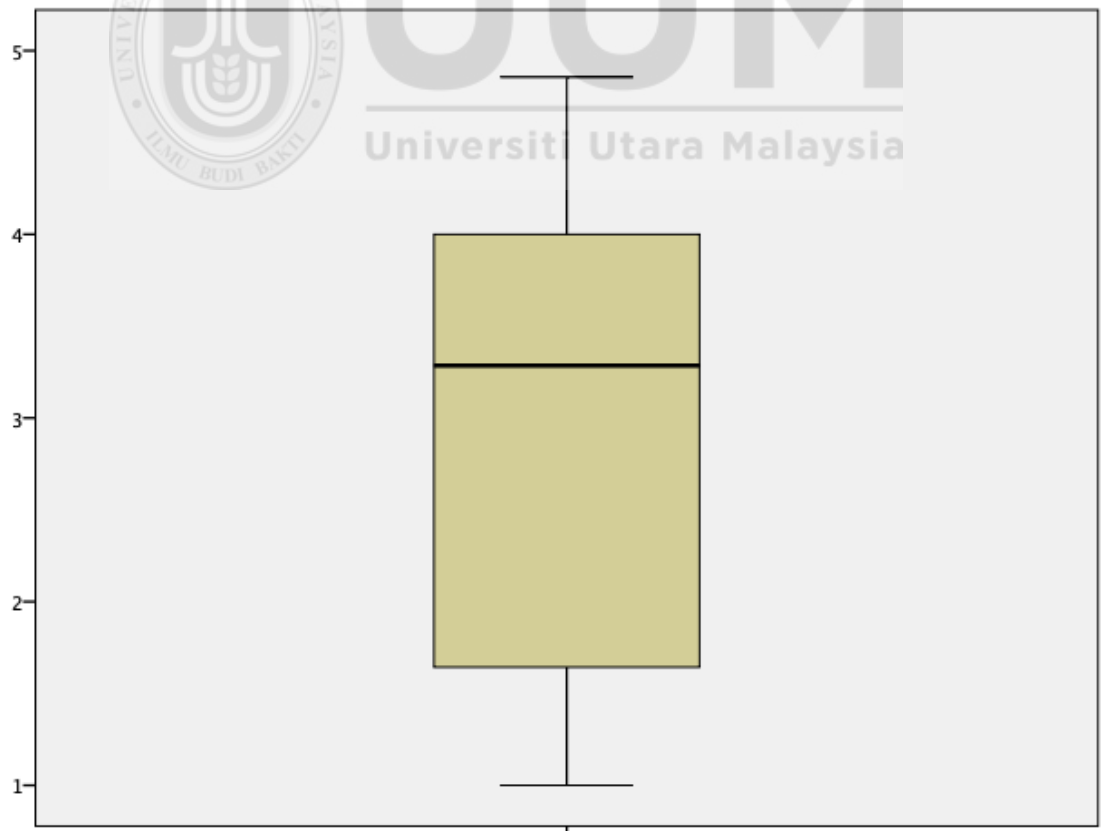
نهاية الاستبيان
شكرا جزيلاً

Appendix B: Outliers





KM Process



Technological Innovation

Appendix C: Histograms

