

## MODELLING THE INTERNAL FORCES OF SMEs DIGITAL ADAPTATION STRATEGY TOWARDS INDUSTRY REVOLUTION 4.0

Rusly F.H., Talib Y.Y.A., Hussin M.R.A., Mutalib H.A.\*

**Abstract:** This paper explores internal forces that formed the digital adaptation strategy for SMEs embarking on the digital transformation of Industrial Revolution 4.0 (IR4.0). A qualitative case study design was adopted involving Small and Medium-sized Enterprises (SMEs) from the manufacturing and service sectors in Malaysia. Data was gathered through semi-structured interviews and supported by the resources from the firms' website. Adopting the Planned Process Change Model and Technology Adaptation Process Model as new theoretical lenses in the digital adaptation study, findings from the multiple case studies using thematic analysis revealed four dimensions of internal forces driving SMEs' digital adaptation: business strategy, value creation, digital leadership and digital talent. Findings contribute to the theoretical development of the digital adaptation strategy from a change management perspective.

**Key words:** change adaptation, change management, digital adaptation, digitalisation, digital strategy, IR4.0, SME.

DOI: 10.17512/pjms.2021.24.1.18

*Article history:*

*Received* September 21, 2021; *Revised* November 14, 2021; *Accepted* November 30, 2021

### Introduction

The tremendous changes in the business environment in tandem with the Industry Revolution 4.0 (IR4.0) led to the existence of businesses with innovative business models leveraging advanced technologies, such as cloud computing, artificial intelligence, big data and additive manufacturing, to name a few. The need for digitalisation seems to accelerate among businesses across industries and economic positions (McCarthy et al., 2021). Unexpectedly, adaptation to digital technologies is no longer an option for businesses. Early adopters have a bigger opportunity to improve operations and penetrate the market. The fact is hard; yet changes happen too fast, and those who are still waiting to adapt to the technology revolution, in particular, the Industry Revolution 4.0, will be pushed aside and may lose their market share shortly (Autio, 2017; Priyono et al., 2020; Nosita et al., 2020). Along with the development, there is an increased curiosity and interest to assess firms' change initiatives towards digitalisation worldwide (McCarthy et al., 2021) because

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\* **Fariza Hanim Rusly** Dr, **Yurita Yakimin Abdul Talib** Dr, **Muhammad Rosni Amir Hussin** Dr, **Hafizah Abd Mutalib** Dr, Universiti Utara Malaysia, Tunku Puteri Intan Safinaz School of Accountancy, Malaysia.

✉ corresponding author: hanim@uum.edu.my

✉ yurita@uum.edu.my; mohdrosni@uum.edu.my; amhafizah@uum.edu.my

digital transformation often leads to disruption in the firms' operations (Autio, 2017).

Previous studies indicate Small and Medium-sized Enterprises (SMEs) could gain benefit from digitalisation and have the opportunity to harness the technologies in improving operations, increased productivity, enhancing market presence, labour cost saving, reduced human errors and accelerated production speed (Bellakhal and Mouelhi, 2020; Lee et al., 2020). Notwithstanding scarce financial, human resources and strategic capabilities to adopt new technologies among SMEs (Khai et al., 2020; Lee et al., 2020; Kee et al., 2019), SMEs' structure, which is more flexible as compared to large firms, offers opportunity in terms of quick decision making (Ghobakhloo and Ching, 2019; Hanif, Rakhman, Nurkholis, & Pirzada, 2019). However, firms face challenges that are reflected in the decision of non-adoption by firms (Raj et al., 2020).

Despite the growing claims that digital transformation could enhance business expansion and lead to better performance, the move towards digital transformation is still low. Particularly, the process of moving towards digitalisation could be puzzling by the absence of an established digital strategy, even among large firms (Lee et al., 2020; Rony et al., 2021). Additionally, there is a high tendency among businesses to assume digital transformation as a hard technological implementation and fail to appreciate the journey as a change process that requires an adaptation strategy that gradually results in firms' operational improvements (Cimini et al., 2020; Machado et al., 2021; Aicha et al. 2021). Explicitly, the misconception of digital adoption as a one-time event rather than a transformation process and the absence of a holistic digital adaptation strategy represents a crucial loophole in driving firms' digital transformation; hence, demand for more empirical exploration to understand the phenomenon.

#### ***Digitalisation leading to digital transformation***

Digitalisation is defined as the application, usage or adoption of digital technologies and infrastructures by businesses (Autio, 2017; Khai et al., 2020; Lee et al., 2020). The availability of technologies, such as Internet, free end-user-generated data, and data sharing have helped to enable platforms of the current digital business (Kotarba, 2018). Irizar (2021) broaden the definition by stating that digitalisation is a process of embarking on a digital business that causes changes in a firm's business model and affects economy and society (Autio, 2017). These processes of change consequently cause digital disruption in business, economic and societal contexts; this phenomenon reflects a phenomenon known as digital transformation (Saputra, & Hindriari, 2021).

Past literature discussed various internal factors affecting the implementation of digital transformation in businesses, including resource availability, structure, process, business model design, people, IT capability, technology knowledge and skills, strategy and integration and expected benefits from digitalisation (Kane et al., 2017; Arniati et al., 2019; Pirola et al., 2020; Sainger, 2018; Yu and Schweisfurth, 2020). In the context of the European Union, synergies of fund, infrastructure, ICT

education and society digitization are vital for strengthening digital development (Kersan-Skabic, 2021). Thus, in line with Erboz (2017) and Priyono et al. (2020), a strategic combination of organizational resources, capabilities and digital technologies could produce massive value and create a new business model. Consequently, it brings fundamental changes for firms that require the formulation of an effective digital adaptation strategy.

#### ***Challenges of SMEs' digital adaptation***

Digital transformation opportunity is not limited to large businesses (Autio, 2017; Lee et al., 2020). SMEs should be encouraged to transform through digitalisation since SMEs are claimed to create more new jobs compared to larger firms (Eggers et al., 2013). Despite the promising benefits, literature revealed that SMEs move towards digital transformation is still low than expected (Yu and Schweisfurth, 2020; Zimmerman, 2018). Literature also highlights challenges that impede successful digital transformation among SMEs include deficient knowledge and core technologies (Hamzeh et al., 2018), misunderstanding of automation effects on the employment structure (Makgato, 2020), and scarce of an appropriate framework, strategy, roadmaps and actionable steps driving the IR4.0 transformation (Mittal et al., 2018; Pirola et al., 2020). To add, Lee et al. (2020) claimed that the complexity of digital technologies, resource scarcity, and institutional and infrastructural constraints complicate the decision towards digital adoption. This implies that SMEs are still struggling to understand how the digital transformation process should be implemented (Ganzarain and Errasti, 2016) and how the process impacts the business operations and its people. Hence, more efforts are required to facilitate the digital transformation process among SMEs.

Autio (2017) highlighted the crucial need to reinvent business models and establish a clear pathway for new digital start-ups, while Ulas (2019) revealed that the digital transformation objectives must be clearly defined upfront. Further, Andrei et al. (2021) stated businesses, particularly SMEs, need to adapt their business models to the dynamic environment caused by the global shifts. Nevertheless, empirical works defining a holistic digital strategy is still inconclusive and at an early phase (Rachinger et al., 2019). Due to the fact that the impacts of the key enablers of digital transformation could vary depending on the country's context, Rassool and Dissanayake (2019) highlighted a demand for more studies to offer insights in developing a strategic framework of digital transformation in the various economic settings. Although digital strategies among firms could be generic at a top level, the adaptation process is distinctive for each firm; hence the journey of transformation is unique and dynamic (Priyono et al., 2020). The extant literature also highlighted the misleading perspective in seeing digital transformation as a static event focusing on technology implementation (Machado et al., 2021) rather than a process of change that affect the firms' fundamental strategy and operations.

From the perspective of the technology adaptation model, Fadel (2012) theorizes that individuals adapt to changes by adjusting job routines and technology to create value from the change. At the firm's level, DeSanctis and Poole (1994) postulate that pre-

existing structures of task and firm environment, internal structure, technology, and spiritual dimensions that exist in the firm could affect the process of technology adaptation. Moreover, Leonard-Barton's study (1988) posits that a successful technology adaptation process consists of cycles of misalignments, realignment, and consequently minor misalignments until reaching a stable state between technology application, delivery system and performance measures. Further, the Planned Process of Change model by Porras and Silvers (1991) delineates that the change process is initiated by change interventions that impact job setting or firms' vision, or both. These changes consequently affect individuals' cognitive process, realising the needs for change and shifting the individual's behaviour. Finally, the changes result in organizational improvement. Similarly, Chrisanty et al. (2021) suggest that effective transformation in business with dynamics internal and external forces would increase organizational readiness for change; consequently, affecting employees' better performance. The exploration of digital transformation from the planned process change perspective enables a holistic change analysis addressing what, how, and why change occurs and be accomplished (Burke, 2011). In line with Hanelt et al. (2021), an analysis of digital transformation from the perspective of a change process could contribute towards a new model of change implementation. Building from the above review of literature, this study intends to address existing gaps by proposing that firms' moving towards digitalisation through IR4.0 technologies adoption should consider the move as a planned change process; thus, picking up the view from the change management strategy. The current study aims to provide insights on two broad research questions: what internal forces are forming SMEs' digital change adaptation strategy and how are the interplays among these forces moving SMEs towards digital transformation (Saputra et al., 2020). Due to the imperative need to understand the phenomenon in-depth, which is unique to each SME's context, the study was carried out under the umbrella of a qualitative approach.

#### ***SMEs' IR4.0 Digital Adaptation Strategy from a Change Perspective***

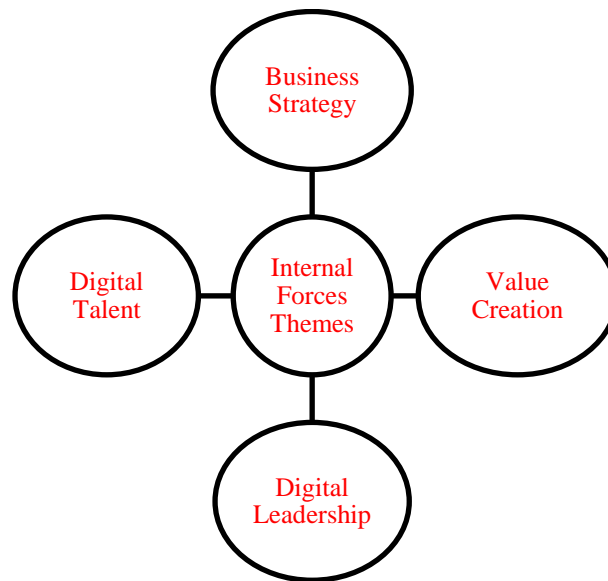
The study employs qualitative multiple case study design to acquire an in-depth understanding of the internal forces that move SMEs towards digital adaptation of IR4.0. Purposive sampling was used, and the preliminary review was performed by browsing the firms' websites to ensure that the firms involved in digitalisation initiatives. Five SMEs were included in the multiple case studies, consisting of three manufacturing and two service firms. The study of Yin (2009) recommends about six sources of evidence in multiple case studies, while Creswell (2007) proposes no more than 4 or 5 cases. Additionally, Marshall et al. (2016) found that, in the context of the information systems-related studies, most multiple case studies contain 2 to 7 cases (57%) while fewer studies contain 8 or more cases. A qualitative study aims to uncover diverse views from the participants; therefore, even a small number of participants' involvement could yield extremely fruitful findings given the integrity in recruiting participants (Crouch and McKenzie, 2006). As such, semi-structured interviews deploying an interview protocol were conducted with the Chief Executive

Officer (CEO) of these SMEs. The CEOs are qualified as well-accepted key informants to share about SMEs' management and strategy since they represent the most knowledgeable and valid sources of information in SME studies (Eggers et al., 2013; Sutrisno et al., 2020). The interviews were video-recorded, and transcriptions were analysed and used in multiple case analyses using the thematic analysis by Braun and Clark (2006). The deductive analysis enables the identification of patterns of response and meaning of the internal forces for SMEs' digital adaptation strategy. Additionally, audiovisual sources from firms' websites were used in triangulating firms' background operation and initiative towards digital adaptation.

Findings revealed four themes representing the internal forces for digital adaptation strategy among the studied SMEs, molded by a changed perspective: business strategy, value creation, digital leadership and digital talent characteristics. Nevertheless, the way these internal forces interplay together is unique depending on the context of the SMEs' nature of business operations and setting. Discussion of findings from real cases experience in various sectors revealed how these internal forces dynamically interact in gearing towards SMEs' digital adaptation. Backgrounds of the five SMEs are presented below, with acronyms representing each SME.

- C01 Established manufacturer in the plastic industry
- C02 Established aerospace engineering and data analytics service provider
- C03 Start-up manufacturer in medical engineering
- C04 Start-up of smart technology solutions provider
- C05 Start-up manufacturer of robotics and IoT products

Fifteen categories were derived from the initial codes leading to the development of four themes representing dimensions of internal forces shaping SMEs' digital adaptation strategy, as depicted in Figure 1.



**Figure 1: Internal Forces of Digital Adaptation Strategy**

The business strategy represents the first internal force in the development of the Digital Adaptation Strategy. SMEs focus on leveraging core competency, technology pioneering, diversifying business and refining business models as strategies to embark on digitalisation. In terms of leveraging core competency, C02 realized that the firm has a core competency in data analytics to offer multidisciplinary consulting services. For C03, the main motivation to embark on 3D technology was their experiences producing implant products. With limited medical engineering expertise available locally, the firm sees the opportunity to invest in technology that can expedite the process of designing and producing an implant for the medical industry. As a technology-based start-up firm, C03, C04 and C05 set the strategy to pioneer digital products and services to potential clients. For instance, C04 aims to be the pioneer in the digital technologies market; thus, their strategy is to be ahead of their competitors. *“Now that we know that others will follow us and venture into Artificial Intelligence. We need to keep innovate, think of what’s next. We have to be quick and ahead of others. That is our strategy”* (C04). In a similar vein, C05 believes becoming early innovator in robotics technology would enable them to be more competitive internationally. As cited, *“The firm was established with the dream of realizing Malaysia to be competitive in terms of digital transformation. At our firm, we see that the only chance for us to be competitive internationally is to equip ourselves with technology, especially in robotics and automation”*. Erboz (2017) posits that along with digital transformation, many firms are crafting their future pathway by creating a new business model as an adaptation strategy.

On the other hand, for established firms, such as C01 and C02, the move towards digitalisation is seen as a strategy to sustain in the market. C02 acknowledged the macro perspective of the global industry changes had forced businesses to shift their business model from product-based to services. In keeping up with the changes, businesses need to be more adaptable; in C02, diversification is needed to meet the changing demand. For instance, *“There has been a shift in the industrial landscape globally, with the advent of tech companies now or technology products dominating the world and the business models shifting from consumer product consumption to service consumption... We've done a lot of different things, but then that our business is diversified because of an in-depth analytics capability for design that we had. So, this was how this evolution took place”* (C02). Similarly, C01 highlighted that their business model is recently changed with more revenue coming from retailers than wholesalers. Refinement in the business model requires the firm to cater to orders from retailers who demand high variation in products. Thus, C01 needs technology that can support them with accurate data for effective projections of retailers' demand and production planning. As suggested by Khai et al. (2020), business models modifications appear to be a critical survival strategy for most SMEs in the digital transformation process. Findings are also in line with the study of Priyono et al. (2020) that highlighted that firms chose varied paths in modifying their business model towards digital adaptation depending on its contextual influences.

Secondly, the participants revealed value creation as another internal force for them to embark on digital transformation. Value is created through digitalisation by enabling customization, gaining competitive advantage, increasing efficiency, and ensuring data accuracy. All of these values are seen as fundamental to achieving business sustainability. Priyono et al. (2020) proposed that a balanced integration of a firm's resources, capabilities, and digital technologies is an essential pre-requisite to creating values from digital transformation. C01 emphasized that digitalisation enables the company to efficiently provide customization, which is an essential feature in the company's production. As an established producer of plastic bottles and containers, it is critical to ensure their product caters to the many needs of different customers. For instance, *“Nowadays, end-users prefer custom and variety orders. We can produce the same plastic product, but in different sizes, colors and level of transparency to suit the customers' needs”* (C01). While production of some product components is outsourced due to space and cost-control purposes, C01 believes that in future, with the availability of digital technology, the company would be able to produce all components under one roof. Next, as a producer of medical and dental support products, C03 adopts 3D printing and additive manufacturing in its production process. *“We use 3D printing or additive manufacturing to come up with the customized medical implant...mostly medical devices for the government and also private hospitals”* (C03). Each product produced need to be catered for specific individuals, such as dental implants and cases. Therefore, the adaptation to digital technology is highly crucial for businesses to respond to customization and variations to suit the customers' orders. This finding is in line with the discovery of

Yu and Schweisfurth (2020), which states that IR 4.0 technologies are imperative for manufacturers producing high product variety with greater process automation in the firms' operations.

Adoption of digitalisation is also driven by the aim to create values in enhancing competitive advantage. C02 highlighted that the company has a solid knowledge base in data analytics; thus, leveraging its expertise to gain a competitive advantage by offering related analytics consulting services to its clients. The same vein is shared by the CEO of C04, who believes that digital technology should be adopted fast to secure a competitive advantage and outperform competitors. Although competition becomes evident, digital technology innovation will definitely secure the position of early adopters. As the early adopter, C04 shared that *"In drone service, we started in 2016. We are among the pioneer at that time. Competition was scarce. Now, we can see, competition is growing... Late implementation will be a burden. If you don't do it now, you will realize that you will be left behind"* (C04). Digital technology also creates value in increasing efficiency in business operations. C05 claimed that *"In order to increase efficiency, the only way is through automation"* (C05). Efficiency is also observed through the ability to access data on a real-time basis to analyse whether the business processes are working efficiently. As quoted, *"Why actually we do it because this IR4.0 gives us access to the real-time data, in terms of accounting data, engineering process data and manufacturing process data; this is the data that we use for the business"* (C03). Also, the accuracy in the additive manufacturing process is ensured with the use of digital technology. It enables the drafting and design of specified products, visualizing and simulating how the designs perform in real scenarios, thus providing accuracy in the production process. Consequently, findings highlighted that the expected benefits created from digital technologies in improving firms' operational efficiencies and reducing the risk of operations failures are the key dimensions in the development of the digital adaptation strategy Naik et al., (2021). This dimension of value creation is in line with the research of Yu and Schweisfurth (2020) that proposes expected benefits as one of the main drivers of change in the implementation of IR4.0 technologies.

This study also discovered strong digital leadership as another dimension of the digital adaptation strategy. The characteristics of a digital leader include technology-foresightedness, technology passion, technology openness, digital content knowledge, and broad view perspective of IR4.0. As shared by C01, although the firm was established more than 20 years ago and secured a steady share in the market, the current management realized the importance of adapting to digitalisation. *"The head (top management) is very important. Our top management realised that we need to go for digitalisation first; things will be more efficient, and also, we are able to provide high mix low volume kind of service. We can implement this kind of system easier"* (C01). This study also found that young SMEs' leaders tend to adapt to digital technology at a greater pace than the old, aged leaders. Despite resistance at the beginning of the digitalisation initiative, young leaders' transformation effort encouraged employees to move in the same direction. This series of alignment and



misalignment reflects the Planned Change Model proposition by Porras and Silvers (1991). Leaders' openness towards digital technology is another crucial element in formulating the digital strategy. In C02, for instance, the CEO expertise in aircraft engineering services and structural analysis triggered the move towards data analytics consulting. As mentioned, *"For the SMEs to go forward and to be aligned with the technology if needed, force is from their own management"* (C02). Additionally, leaders with technical background and digital knowledge are eager and have the courage to venture into new businesses by establishing start-up firms focusing on digital technologies products and services such as in C03, C04 and C05. C05 enlightened that *"One strong factor that drives us to embark on IR4.0 is our passion on the technology and believes that robotics can solve the problems faced by our potential clients and makes us competitive"* (C05). Moreover, leaders need to have a broad perspective of digital technologies, including appreciating their potential and practicing continuous learning towards new digital technology. For example, *"We have to change our mindset. We cannot follow the traditional way of thinking. We observe that many companies implemented new technology, their companies are still failing. But many companies were successful too. For our situation, it's very desperate, so it was a very hard time. At that time, we were very desperate and need to learn. Through learning, if you are willing to learn, then you are willing to accept"* (C01). For C05, the CEO believes it was a smart decision to venture into the IR4.0 technology businesses. *"After 5 years venturing, we believe that we are on the right track investing in this industry"* (C05). Consequently, digital transformation requires leaders to enhance their conventional leadership qualities with digital leaders' qualities. Such characteristics would drive the firm to acquire in-depth knowledge about digital technology applications and set a clear strategy for its people to move along with the digital transformation. Consistent with Porfirio et al. (2021), Promsi (2019) and Sainger (2018), leaders' mindset and digital knowledge and skills are indispensable for firms to embark on digital transformation, which enables the leaders to plan an appropriate strategy for digital adaptation and be opportunistic (Suryani and Pirzada, 2018) in leveraging digital technologies to enhance firms' competitiveness.

Finally, in line with Sainger (2018) proposition on people's importance in digital transformation, findings revealed that digital talent is another crucial dimension in formulating SMEs' digital adaptation strategy. Existing and potential employees need to have certain digital characteristics that can make them go along well with firms' digital adaptation initiatives. As mentioned by the CEO of C05, *"In order to change towards automation, it requires a change in people's mindset to work as high skilled workers"* (C05). Digital talent characteristics dimension as discovered by the current study are composed of digital-vibrant talent, innovative and agile mindset and job fit/talent alignment. Realising the importance of employee acceptance, C03, C04 and C05, hired young talents on full-time basis and freelancers whom they believed were more familiar and vibrant with new technologies and were willing to learn and explore the capabilities of the technologies. As shared by C03, *"90% of my*

*staff actually all young, at the age of 23 to maybe 27, it's very young team here. But they can actually deliver what we want, and everything is that they love all these digital processors. It makes things easier. I think they have been exposed to this new technology and they are growing up with all these gadgets” (C03).* However, this does not mean older generations resist changing, but they need a longer time to learn and familiarize themselves with the technology.

The current highly competitive job landscape requires firms to acquire talents who can work in an agile environment. Participants claimed that digital talents should have characteristics of being creative, innovative, flexible, and able to realise ideas into actions. As quoted, *“The companies now are agile businesses that is trying to create value and saying that we have a market. This is the idea of how we're going to tackle the market. We need people to realise that idea” (C02).* Participants further agreed that innovative and agile mindset talents characteristics could easily be shaped and moulded to meet digital adaptation needs. For example, *“We don't have a good process engineer that familiar with this new technology. But we can train them [young talent] and expose them to this technology and they are really, really fast with it” (C03).* CEO of C02 and C03 further explained the need to prepare a conducive work environment for employees to build their competence and full potentials. As shared by C05, *“When we started the business, we were actually creating the opportunity for local talents to showcase expertise. The country has many local engineering grads, but we are yet to fully utilise their capabilities and potentials” (C05).*

Another strategy is to employ competent talents and could fit with the job specialisation. As mentioned by C02, *“What you need is job fit... Job or occupational specialisation, in which the person's personality, his values and his interests all must align to what the person is able to do and the alignment must be in the context of the job, of the competence that they are trying to create. Here is where it gets a bit more complicated” (C02).* Hence, it is important to hire new talents that match the job's needs because if the available talents do not understand the technology, they will not be able to fully utilise it, leading to a huge loss in investment. For example, C04 has experts to develop in-house and customized IR4.0 technology, whereas C03 has pool of young talents to use IR4.0 technologies. Nevertheless, C03 depends on overseas technology providers to provide proper training and technical support on the invested technology. Inconveniently, dependency on overseas providers leads to maintenance costs, communication, and logistics issues. Hence, the CEO emphasized the real need for local talents to become technology developers rather than technology users (Pirzada et al., 2017). *“We are still a user of the technology; we have yet to produce our own technology...So that's the reality. And it makes hard for us because we rely quite heavily on the abroad or overseas technology” (C03).* The concern is in tandem with the CEO of C04, who emphasized the risk associated with high dependency on overseas expertise, including the risk of the overseas company going bankrupt or not being able to provide the expertise anymore in the near future. If this happens, it might jeopardize the company reputation if they do

not have the local talent to handle unexpected situations. Findings derived from the multiple case studies imply the same connotation in the studies of Cimini et al. (2020) and Hecklau et al. (2016) that highlight the responsibility of management to upgrade human skills set among people dealing with complex technology in digitalisation and to manage risks (Pirzada, 2020; Pirzada et al. 2016) associated with its investment. Having technology in place will not work well if the people resist or are reluctant to learn, explore and utilise the digital technologies to the optimum level that can create values for firms.

### **Conclusions**

This study explores the internal forces forming SMEs' digital change adaptation strategy and how the interplays among these forces move SMEs towards digital transformation. In summary, this multiple case study research revealed four internal forces that are pertinent in the development of the digital adaptation strategy among SMEs studied. The in-depth case study design enables exploration that reflects the digital adaptation initiative as a long journey and process, which is unique and shaped by SMEs' context. More importantly, SMEs experienced a series of evaluations and decisions along the digital adaptation process in order to achieve a successful adaptation, which aligns with the theoretical understanding of the technology adaptation and the planned change lenses.

Theoretically, findings contributed towards the development of digital adaptation literature, particularly providing justification and evidence for the need to analyse digital transformation as a process of organizational change. Dimensions and categories representing the internal forces of the digital adaptation strategy derived from the qualitative data enrich understanding of the phenomenon and contribute to the theoretical development of digital transformation as a contemporary change process. From a practical perspective, findings could provide guidelines for SMEs embracement of the digital transformation, particularly in a developing economy environment. Therefore, policymakers and implementers of digital transformation in SMEs should consider various dimensions of the internal forces that can drive firms towards a successful digital adaptation process. Interestingly, findings revealed a complex interplay among the dimensions, which justified the critical need to establish a structured roadmap or strategy for digital adaptation. Adaptation to digital transformation guided by a comprehensive digital strategy is extremely important to ensure SMEs move on the right path towards their digital transformation initiatives. Although findings from this qualitative multiple case study have limitations in terms of its generalizability to the population of SMEs, findings offer a holistic understanding of the digital change adaptation phenomenon through the interpretive analysis, which could be fundamental for further theoretical development in the change management and technology adaptation literature and managerial practices. Future studies of the cross-sectional survey could be conducted to validate the proposed dimensions of the digital adaptation strategy.

## Acknowledgements

This research was supported by Ministry of Higher Education (MoHE) of Malaysia through Fundamental Research Grant Scheme (FRGS/1/2019/SS01/UUM/02/9).

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## MODELOWANIE WEWNĘTRZNYCH SIŁ MSP STRATEGIA ADAPTACJI CYFROWEJ W KIERUNKU PRZEMYSŁU REWOLUCJI 4.0

**Streszczenie:** Niniejszy artykuł bada siły wewnętrzne, które ukształtowały strategię adaptacji cyfrowej dla MŚP rozpoczynających cyfrową transformację rewolucji przemysłowej 4.0 (IR4.0). Przyjęto jakościowy projekt studium przypadku z udziałem MŚP z sektora produkcyjnego i usługowego w Malezji. Dane zostały zebrane za pomocą częściowo ustrukturyzowanych wywiadów i poparte zasobami ze strony internetowej firm. Przyjmując Model Planowanej Zmiany Procesu i Model Procesu Adaptacji Technologii jako nowe soczewki teoretyczne w badaniu adaptacji cyfrowej, wnioski z wielu studiów przypadku z wykorzystaniem analizy tematycznej ujawniły cztery wymiary sił wewnętrznych napędzających adaptację cyfrową MŚP: strategia biznesowa, tworzenie wartości, przywództwo cyfrowe i talent cyfrowy. Ustalenia przyczyniają się do teoretycznego opracowania strategii adaptacji cyfrowej z perspektywy zarządzania zmianą.

**Słowa kluczowe:** adaptacja do zmiany, zarządzanie zmianą, adaptacja cyfrowa, cyfryzacja, strategia cyfrowa, IR4.0, MŚP.

## 中小企业数字化适应战略的内力建模 面向产业革命 4.0

**摘要：**本文探讨了中小企业在工业革命 4.0 (IR4.0) 数字化转型过程中形成数字化适应战略的内在力量。采用定性案例研究设计，涉及马来西亚制造业和服务业的中小企业。数据是通过半结构化访谈收集的，并得到公司网站资源的支持。以计划流程变革模型和技术适应流程模型作为数字化适应研究的新理论视角，通过专题分析的多个案例研究结果揭示了驱动中小企业数字化适应的四个内在力量：商业战略、价值创造、数字化领导和数字人才。从变革管理的角度来看，研究结果有助于数字适应战略的理论发展

**关键词：**变革适应，变革管理，数字化适应，数字化，数字化战略，IR4.0，中小企业