

# Industry Modern: A Solution for Sustainable Business Performance's Technology Challenges

Alyusha Asmolov<sup>1</sup>, Avraam Ledentsov<sup>2</sup>

Faculty of Dentistry and Medical Technology<sup>1,2</sup>

University Embankment, 7/9, Sankt-Peterburg, Rusia<sup>1,2</sup>

e-mail: [alyushaasmolov@yahoo.com](mailto:alyushaasmolov@yahoo.com)<sup>1</sup>, [avraamledentsov@yahoo.com](mailto:avraamledentsov@yahoo.com)<sup>2</sup>



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## Abstract

*Due to a lack of resources and other market issues, technology adoption is always a difficult task for Small and Medium-Sized Enterprises (SMEs). The sustainable business performance of SMEs is adversely affected by numerous technological obstacles. Industry 4.0, on the other hand, has the potential to resolve a number of technology issues. Industry 4.0 seeks to achieve a higher level of automation in addition to a higher level of operational effectiveness and productivity. Therefore, the goal of this study is to determine how Industry 4.0 can help SMEs in Thailand achieve sustainable business performance. Using Partial Least Square, data from managers of SMEs have been gathered through the preparation of a survey. The questionnaire was used to collect the data, and simple random sampling was used to distribute the questionnaires. A total of 500 questionnaires were distributed to Thai small and medium-sized enterprises' managerial staff. 280 of the questionnaires were returned, and 270 of the responses were found to be legitimate. Partial Least Square (PLS)-Structural Equation Modeling (SEM) was used to analyze the data. According to the findings, one of the keys to the development of sustainable business performance among SMEs is Industry 4.0. Big data, the Internet of Things, and the smart factory are examples of Industry 4.0 elements that help to encourage the use of information technology (IT), which improves long-term business performance. Additionally, the positive connection between IT implementation and Industry 4.0 is bolstered by organizational structure and procedure.*

**Keywords:** Industry 4.0, Big data, Business performance, IoT, Smart factory, SMEs

## 1. Introduction

Industry 4.0 seeks to achieve a higher level of automation in addition to a higher level of operational effectiveness and productivity [1].

It has been mentioned that a number of the features of Industry 4.0 are highly connected with internet technologies as well as progressive algorithms. This is because Industry 4.0 plays a significant role in the production and service sectors. But they also say that Industry 4.0 is one of the technical ways to add value and use good knowledge management practices [2].

A systematic and comprehensive review of studies on Industry 4.0 is lacking, despite the extensive literature on the subject. As a result, this study presents the significance of the fourth industrial revolution in Small and Medium-Sized Enterprises (SMEs) and offers a framework based on Industry 4.0 [3]. It shows how SMEs can use Industry 4.0 to overcome a variety of technological obstacles and boost sustainable business performance. This study



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focuses particularly on Thai small and medium-sized businesses. Figure 1 depicts an increase in the performance of Thai SMEs in 2020. Annual revenue increased by 44% in 2020, efficiency increased by 42%, business savings increased by 31%, debt decreased by 26%, and investment increased by 25% in 2020 [4].

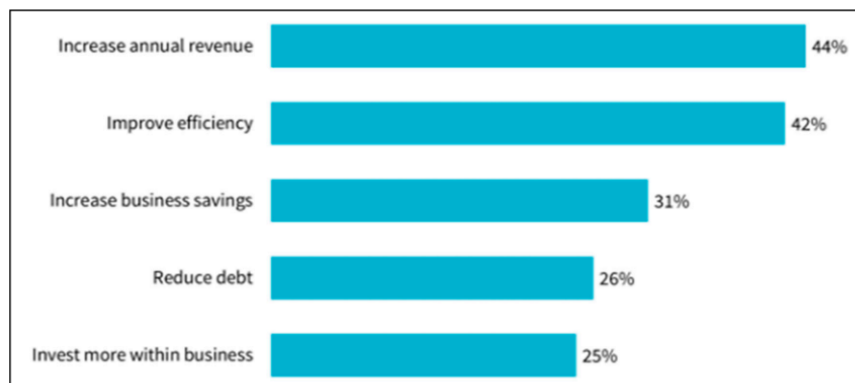


Figure 1. Thailand SMEs Performance. Source: RFI Group—Thailand SME Banking Council (2020).

In many nations, small and medium-sized enterprises (SMEs) are the backbone of the economy due to their substantial contribution to GDP generation. Small and medium-sized businesses (SMEs) face a variety of challenges. One of them relates to technology [5].

The performance of SMEs is not smooth because of technological obstacles. When SMEs adopt the most recent technology, they face restrictions similar to those faced by large corporations. Due to a variety of obstacles, the performance of Thailand's small and medium-sized businesses is poor. Performance growth is inconsistent for these SMEs. As a result, small and medium-sized businesses (SMEs) face a performance sustainability issue because adopting new technologies is always challenging due to a lack of resources and other market issues. Implementation of technology presents challenges for SMEs. These technical issues concern the organization's functional structure, data extraction, and data management, which support the implementation of new technology [6].

For technology to work well, it also needs skilled people. As a result, in order for SMEs to successfully implement the most recent technology, they require high levels of human capital. With the assistance of Industry 4.0, all of these issues can be resolved. Industry 4.0 contributes positively to the resolution of various data management and technological issues. Industry 4.0 has a significant positive impact on product and service growth as a result of these features. Big data, the Internet of Things (IoT), and smart factories are just a few of the Industry 4.0 factors that can help improve sustainable performance. As a result, by resolving various technology issues, incorporating Industry 4.0 can improve sustainable business performance. Therefore, the goal of this study is to determine how Industry 4.0 can help Thailand's SMEs achieve sustainable business performance [7].

One of the first studies to examine the role of Industry 4.0 in technology management is this one. There is literature that demonstrates the connection between technology management and Industry 4.0; However, studies that formally documented the role of Industry 4.0 in resolving technological issues, particularly in SMEs, were extremely uncommon. As a result, this research added to the existing body of knowledge by providing useful insights into technology management through Industry 4 [8].

## 2. Research Method

This study aims to determine how Industry 4.0 can help Thai SMEs achieve sustainable business performance. There were three major aspects of Industry 4.0 taken into consideration: IoT, big data, and smart factories. The implementation of technology, processes, and organizational structure were also taken into account. Figure 5 depicts the ways in which factors from Industry 4.0 contribute to long-term business performance [9].

A discussion of the study's specifics, including the population, unit of analysis, and sampling design, served as the starting point for this research design. The development of the instrument, which included the design, structure, and measurement scale of the survey questionnaire, came after the discussion of the design of the research. Prior to the data collection, the testing methodology, and the content validity and reliability, the pilot and pretest studies were conducted. The method, procedure, and duration of this study's data collection were finalized in terms of the data collection methodology. This study's hypotheses were tested, analytical methodology and interpretation were discussed, and all of the measures were adapted from previous studies. Measures for the factors of Industry 4.0; Imran et al.'s big data, IoT, and smart factory concepts were adapted [10]. Five items that were adapted from Sabherwal and Kirs (1994) were used to measure IT implementation. Nawarir served as the source for the adaptation of metrics for sustainable business performance. Finally, the Peppard and Ward scale was used to adapt the measures for process and structure.

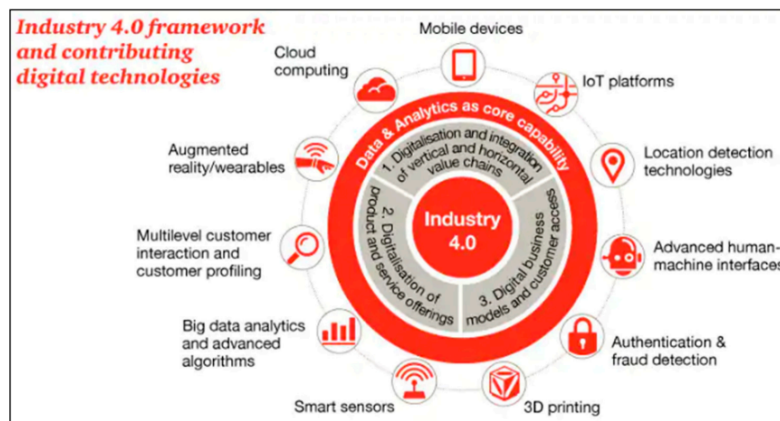


Figure 2. Industry 4.0 technology features and contributions towards digitalization.  
Source: Industry 4.0: Building the digital enterprise, 2016 global industry 4.0 survey, PwC engineering, & construction.

## 3. Results and Analysis of the Data

In this study, the data were analyzed using PLS. However, prior to analyzing the data, a preliminary analysis was carried out to determine the data's normality or non-normality, as well as any missing values, outliers, mean, median, or standard deviation. Table 2 shows this analysis. There is neither an outlier nor a missing value in the data. In addition, the data are found to have a normal distribution. Analytical Methodology and Interpretation SPSS PLS-SEM The pilot study used 70 responses as its starting point. The questionnaire's reliability and validity were found to be satisfactory in the pilot study. Following the conclusion of the pilot study, a total of 500 questionnaires were distributed to Thai SMEs' managerial staff [11].

The 7-point Likert scale was used to conduct the survey. There were two main sections to the questionnaire. The respondent profile, which included their age, income, gender, level of education, and marital status, served as the foundation for the first major section. Key scale items for each variable served as the foundation for the second section [12]. It was thought that small and medium-sized businesses (SMEs) in the clothing and textile industries should collect the data. A response was given to managers who were involved in these SMEs' technology management. Ten incomplete questionnaires were excluded from the analysis out

of the 500 that were sent out, and 280 were returned. 56% of people responded. As a result, 270 responses were found to be legitimate. 54 percent of responses were valid. As a result, 270 responses were utilized for the data analysis [13].

From October 2018 to December 2018, data were gathered.

All of the measures were adapted from earlier research measures for the factors of Industry 4.0; Imran et al.'s big data, IoT, and smart factory concepts were adapted (2018). Five items that were adapted from Sabherwal and Kirs (1994) were used to measure IT implementation. Nawair served as the source for the adaptation of metrics for sustainable business performance. Finally, the Peppard and Ward scale was used to adapt the measures for process and structure [14].

#### **4. Discussion**

According to the study's findings, Industry 4.0 plays a significant role in overcoming technological obstacles and improving sustainable business performance. The factors of Industry 4.0—big data, IoT, and smart factories—have a significant impact on the long-term performance of Thai SMEs' businesses. The research is supported by these findings. Products and services benefit from these factors, which have a significant impact on performance. Numerous studies demonstrate that Industry 4.0 improves production, which improves business performance [15].

In general, new technology can be implemented more effectively with big data. It has a significant connection to the adoption of technology. The current study came to the same conclusion. IT implementation benefits from big data. As a result, a number of technology-related obstacles can be overcome through the implementation of big data. It provides better technology that encourages more effective ways to store data [16].

As a result, SMEs need to make sure that their businesses have better big data technology. In addition, it has been discovered that IoT also makes a significant contribution to the adoption of technology in SMEs. The literature demonstrates that the Internet of Things (IoT) has a significant relationship with the most recent technologies, which have a positive impact on business performance, resulting in an increase in IT implementation. As a result, Thai small and medium-sized enterprises (SMEs) need to implement IoT technology more effectively [17]. Additionally, Stock and Günther (2016) have clarified that the smart factory (SF), which manufactures a variety of smart products, is one of the primary applications of Industry 4.0, which is consistent with the findings of the current study. Additionally, this study found that IT implementation improves long-term business performance. According to the literature, there is a significant connection between technology implementation and business performance [18].

According to Moshiri and Simpson (2011), advancements in information technology have the potential to profoundly alter individual and organizational performance, transform business organization, increase competition, and foster innovation [19]. The development of technology has a significant impact on a variety of economic spheres. Therefore, improved IT implementation plays a significant role in enhancing long-term business performance [20]. The current study also investigates the moderation effect of structure and processes, structure and processes strengthen the connection between IT implementation and big data (BD) [21]. The relationship between IT implementation and smart factory (SF) is bolstered by structure and processes as a moderating variable, as shown in Figure 1 [22]. As a result, the success of IT in businesses can be adversely affected by inadequate or inappropriate structures and procedures. An organization's structure and procedures show a strong connection to IT implementation [23].

#### **5. Conclusion**

This study aims to determine how Industry 4.0 can help Thailand's small and medium-sized businesses (SMEs) overcome a variety of technological obstacles and achieve sustainable business performance. Through Industry 4.0, this study has attempted to address

a variety of technology challenges. Big data, the Internet of Things, and the smart factory are the three main components of Industry 4.0 that are the subject of the study. The study looked at how big data, the Internet of Things, and smart factories can help with IT implementation. This study also shows how IT implementation is influenced by organizational structure and procedures. A survey employs a cross-sectional research design to accomplish this.

According to the findings, the growth of sustainable business performance among SMEs depends on Industry 4.0. Big data, the Internet of Things, and the smart factory are examples of Industry 4.0 elements that help to encourage the use of information technology (IT), which improves long-term business performance. The Internet of Things (IoT) and smart factories aid in the implementation of new technology. The performance of a business is enhanced when new technology is implemented. However, the organization's structure and procedures must be supportive in order to benefit from Industry 4.0 and implement new technology. If the organization's structure and procedures are not supportive, technology implementation will be hampered, which will have a negative impact on long-term business performance.

#### 5.1. The Study's Limitations

The current study provides practitioners with valuable insights; However, there are also limitations to this study. Because the study only looked at Thai small and medium-sized businesses (SMEs), its findings cannot be generalized because each nation's business climate is distinct in terms of resources and competition. As a result, applying the findings of the current study to any other kind of business setting is extremely challenging. Additionally, this study relies on survey questionnaires, which is one of its limitations. Because face-to-face interviews with SME employees may yield superior results. Another limitation of this study is that because Industry 4.0 uses cutting-edge technology, small and medium-sized businesses (SMEs) are unable to fully implement it due to a lack of resources. In this case, the results would be more accurate if the current model were applied to high-tech SMEs.

#### 5.2. Future Research

The survey questionnaires used in this study did not allow for face-to-face interaction with managerial employees. As a result, a mixed method approach ought to be used in subsequent research. Better outcomes may result from manager interviews. Furthermore, the current model ought to be applied to high-tech SMEs because small SMEs have limited resources. Interoperability and cyber physical systems are two additional aspects of Industry 4.0 that should be taken into account in future research.

#### 5.3. Implications of the Study

One of the important questions is how organizations can overcome technical challenges, and it encourages organizations to investigate the possibilities. As a result, the current study has the greatest impact on how businesses handle various technology-related issues. Practitioners can benefit from this study to improve efficiency and address a variety of data handling issues. As a result, the organizations may be able to resolve a variety of issues with the assistance of the current study. Especially for Thai SMEs, this study is beneficial. Theoretically, this is one of the first studies to use a survey to examine the connection between technology challenges and Industry 4.0. As a result, this research provides a survey-based platform for utilizing Industry 4.0 to overcome various technical obstacles. In addition, this study contributes to the body of knowledge by examining the role of Industry 4.0 in technology management. Additionally, it is one of the first studies to discuss the role of Industry 4.0 in technology management. By examining the role of Industry 4.0 in technology management, this study contributes to the empirical literature and makes it easier to carry out subsequent research on the fourth industrial revolution.

#### 5.4. Policy Recommendation

It is always hard to find solutions to problems with the latest technology, especially for small and medium-sized businesses (SMEs). According to the findings of this study, Thai SMEs should use Industry 4.0 features to address technology issues. In order to handle problems, it is suggested that Thai SMEs use big data technology, the Internet of Things, and smart factories. The ability to deal with a variety of obstacles can be achieved through improved implementation of these elements. SMEs must establish a supportive culture and

infrastructure to support new technology before implementing these technologies.

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