International Journal of Latest Research in Engineering and Management (IJLREM) *ISSN: 2456-0766*
www.ijlrem.org || Volume 07, Issue 06 || December 2023 ǁ PP. 01-03

INDUSTRY 4.0 TECHNOLOGICAL ENVIRONMENT AND IT IMPACT ON BUSINESS PERFORMANCES: AN OVERVIEW

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Abstract: *the modern trends in the development of industrial enterprises are characterized by changes in factors affecting their functioning: innovations and new technologies, increasing competition, changing customer requirements for product quality (the concept of product quality from the perspective of its compliance with customer requirements has developed in market economy). Satisfying the needs of customers is the main objective of any enterprise deepened and stressed in the frame of the "Industry 4.0" concept and the information and communication technologies is one of its main tools*

Keywords: *IT, enabling technologies, Industry 4.0, business performances.*

INTRODUCTION

Improving company performance by means of information technologies (IT) has been a longstanding objective for managers and a subject of study for scholars ever since computers were first introduced in the industry [1; 2]. IT is widely recognized as a strategic resource that can enhance a company's ability to collect and analyze data, thereby increasing its agility and capacity to gain competitive advantages and adapt to evolving market conditions. However, not all companies are able to fully leverage the benefits of IT implementation and may encounter the productivity paradox [3]. This has led to ongoing debates among scholars and practitioners regarding whether digitalization truly delivers significant productivity gains or if its impact is limited [4]. Recent research has focused on identifying the mechanisms that enable the transformation of IT into improved company performance and exploring the factors that shape the creation of value [2, 5]. Consequently, IT-driven performance remains a vibrant area of research, while effective management of information systems (IS) is recognized as a key driver for a company's success [6].

IT AS A TOOL FOR BUSINESS PERFORMANCES IMPROVING

Business versatility and the possibility to introduce new business goals is an important factor that characterizes the benefits derived from IT adoption [4, 7]. Although industry affiliation does not directly impact financial performance [8], it shapes the conditions that facilitate the realization of IT benefits. For instance, studies have revealed that lower sales volatility within an industry can amplify the advantages provided by IT systems, leading to improved financial performance [9]. Additionally [5] argues that industry competition can further enhance the benefits of digital technologies, resulting in superior financial outcomes.

In [10] three distinct approaches for studying the impact of industry on IT adoption have been studied: (1) considering the dynamism, munificence, and complexity of the industry; (2) assessing the IT intensity of the industry; and (3) examining the strategic role of IT within the industry. However, it is worth noting that these approaches have primarily been utilized in analyzing data from developed markets, with limited attention given to their application in developing countries.

Furthermore, it has been found that enabling technologies have a greater influence on company performance in countries with well-established IT infrastructure. Given the pressure faced by developing countries to catch up in implementing information systems (IS), industry conditions can serve as a means to bridge the gap and maximize the benefits of IS for company success. Therefore, the aim of this study is to explore how industry factors, specifically dynamism, munificence, and complexity, impact IT-driven company performance in developing countries and contribute to the ongoing discussion on this issue.

Another research gap in IS studies pertains to the availability of information regarding specific IT systems implemented in enterprises. Previous studies have either focused on a single technology or provided a general overview of technologies measured by IT investments, thus limiting our understanding of the effects of IS. While ERP systems have been extensively examined in previous research [11, 12] other IS have received less attention. It is important to note that there are numerous IS at the ERP level, also known as the 4th level according to ISA 95, which significantly contribute to company outperformance. The 4th level, referred to as "Business Planning and Logistics," integrates business processes across various functional areas such as financial management, human resources, supply chain, and customer relationship management. In this study, we will investigate several IS at the ERP level to uncover similarities or discrepancies in their impact on company performance, taking into consideration industry heterogeneity in terms of dynamism, complexity, and munificence.

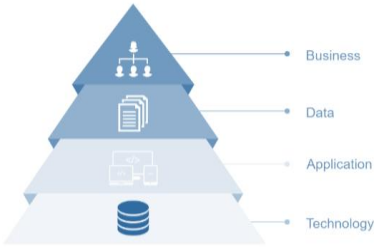

Fig 1. Enterprise Architecture [13]

Business architecture is one of the elements of the enterprise architecture (EA) – a comprehensive description (model) of all key elements and relationships between them (including business processes, technologies and information systems), as well as the process of supporting changes in the business processes of an enterprise on the part of information technology (Fig. 1) [13, 14].

The objects of the enterprise architecture are the existing business processes and their supporting organizational, administrative and technical systems utilizing IT-technology. Thus, business processes are a central element of building both an enterprise architecture and quality management system, which allows us to conclude that the architectural approach to the problem under investigation is applicable.

The modeling of the enterprise architecture and the integration of the quality management system in it is aimed at improving business processes, which will ensure the quality of the enterprise as a whole – reliability, sustainability, technological leadership, investment attractiveness, innovation, employee satisfaction, financial stability. It shows a comprehensive description of the key elements and inter-elements relations.

Development of a quality management system demonstrates the importance of using the architectural approach (describing business architecture of the enterprise) as management instrument for a production enterprise. The architectural approach implies clear objectives: company's goals, the specification of the organizational structure, the description and optimization of business processes, the development and distribution of documentation, the automation of processes and the implementation of a quality management system

Technological development can be viewed through the Technology, Organisation, and Environment (TOE) framework. The significance of the technological perspective cannot be overstated, as it encompasses both the accessibility and attributes of various technologies. Additionally, the organizational context must be taken into account, encompassing factors such as firm size, managerial structure, and communication processes. Lastly, the environmental context plays a crucial role, encompassing industry dynamics, competitors, and government influences.

The institutional theory clarifies how companies make decisions about implementing technologies from the environmental side of TOE framework. According to this theory, these choices are heavily influenced by established industry practices and social influences. As a result, companies are more likely to follow industry norms and traditions rather than making rational decisions based on efficiency. This theoretical perspective helps us understand the challenges involved in decision making related to IT and emphasizes that the industry context can either hinder or provide opportunities for deriving value from IT systems.

Also, according to TOE, technological as well as organisational contexts can be defined by the industrial environment. For example, the financial industry is witnessing the emergence of blockchain technology and digital payment solutions. This leads to the fact that organizations must ensure that their technological strategies align with these industry-specific demands and trends in order to remain efficient and competitive.

BPM is a system is a software application that helps organizations to manage and optimize their business processes. BPM systems provide tools for modeling, analyzing, monitoring, and improving business processes, with the goal of increasing efficiency, reducing costs, and improving customer satisfaction. BPM systems typically include features such as process modeling, workflow management, task automation, data analysis, and reporting. They allow organizations to define and document their business processes, automate routine tasks, monitor process performance in real-time, and identify areas for improvement.

ERP is a software application that assists organizations in managing and integrating their core business processes. It stores data from various departments and functions in a centralized database, including finance, human resources, inventory management, and customer relationship management. ERP systems offer features like financial management, supply chain management, human resource management, inventory management, and customer relationship management.

HRM is a software program that streamlines HR processes within an organization, enabling HR professionals to manage employee data, track performance, and automate routine HR tasks. It typically includes features such as payroll processing, benefits administration, time and attendance tracking, recruitment management, and performance management. By reducing administrative tasks, improving accuracy and efficiency, and enhancing communication between HR staff and employees, an HRM system can help organizations comply with legal and regulatory requirements and manage their workforce more effectively.

ECM is designed to manage, store and track electronic documents and files within an organization. It allows users to securely create, edit, share, and collaborate on documents in an organized manner. The system includes features such as version control, document search and retrieval, access control, and workflow management.

CONCLUSION

This paper has analyzed problems of industry role in moderating technology effect. The impact of industry characteristics on value obtained from implementation of IT technologies was assessed. The literature review has shown that there may be obstacles on gaining positive results from technologies. The study also identifies the significant cross-effects of three industrial characteristics, dynamism, complexity, and munificence with the four IT systems, by their impacts on company performance. As a result, the study delivers a wide range of new empirical knowledge, allowing a better understanding of the multifaceted phenomena of IT-driven performance.

An intriguing empirical finding from this research revolves around disentangling the overall performance impact of IT systems and examining industry-specific effects. The direction and strength of these effects vary considerably, underscoring the distinct roles industries play in driving IT-driven performance. This presents an opportunity to focus on successful examples of IT implementation within specific industries and to leverage and disseminate knowledge across other sectors. By identifying industry best practices, valuable insights can be shared, leading to improved outcomes in various domains.

The next innovative contribution stems from our approach to measuring IT. Previous studies in the branch of research have simply aggregated the costs of technology, but this study takes it a step further by examining individual technologies separately. The findings unveil striking disparities in the effects of each technology, underscoring the vital importance of dissecting technological impacts. Furthermore, these effects differ depending on the specific outcome variable being considered. BPM and ECM emerge as significant drivers of productivity, while HRM proves crucial for enhancing profitability. The overall positive effect of BPM highlights its pivotal role in enhancing company productivity, particularly in developing countries.

The discrepancies in industry specific effects confirmed that different technologies not only have different influences but are also moderated differently by the industrial environment. This conclusion has practical implications for IS scholars and practitioners. It highlights the differences in outcomes for specific IT systems, therefore, breaking down IT capital into separate resources that need to be reconfigured.

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