Industry 4.0 Applications in The Age of Digital Transition and Integrated Reporting, Firm Value: An Analysis Study

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Abstract— In recent years, the industrial sector has seen a substantial rise in the popularity of the notion of the Fourth Industrial Revolution, which is often referred to as Industry 4.0. Intelligent factories, cyber-physical systems, the Internet of Things, and the Internet of Services are all intended to be included in this plan, which builds on previously established standards. The goal of using these cutting-edge technologies is to improve the capabilities of production systems. Progress is being made quickly in the field of research concerning intelligent robots' use in production, often referred to as the revolution of Industry 4.0. In order for organizations to maintain their competitive edge, they need to stay up with the latest developments in Industry 4.0. The accounting profession, the value of businesses, and the practice of integrated reporting are all topics that are discussed in this article as they pertain to the ramifications of the Industry 4.0 revolution. The dissemination of false information from any department inside the company has far-reaching ramifications for the system as a whole, notably within the accounting department. It is the responsibility of this department to generate reports that provide information that may be used to assist decision-making processes and to record the company's financial transactions. In addition to having a big impact on the firm, these reports can potentially affect the overall worth of the business. The use of intelligent systems results in a departure from traditional accounting practices, which helps reduce the number of mistakes caused by human intervention, improves operational efficiency, and reduces errors. Despite this, applying logic continues to be necessary since assessing and examining the subsequent results is necessary. As the revolution continues to unfold, several speculations about its potential repercussions in the future have surfaced. It is projected that the revolution would result in an increasing need for cognitive talents to appropriately evaluate the system's consequences. Despite the concomitant decrease in the need for human labor in the industrial sector, it is anticipated that this change will take place.

Keywords— *Industry 4.0, Integrated Reporting, Firm Value.*

I. INTRODUCTION

Considering the significance of industry within the value chain and its pivotal role in technological advancement, employment generation, and economic stability at the national level, conventional industrial nations have assumed a prominent position in embracing the Fourth Industrial Revolution, commonly known as Industry 4.0. This strategic approach aims to address evolving demands in the global market and enhance competitive positioning vis-à-vis emerging economies. There is a worldwide surge in the use of Industry 1.0, Industry 2.0, Industry 3.0, and, more recently, Industry 4.0-oriented applications. The prioritization of Industry 4.0 is essential to attain sustainability [1].

Digital transformation has profoundly impacted all aspects of business, including business models, production processes, and corporate governance. This development has driven the advancements in information and communication technology (ICT) infrastructure. In the last ten years, enhancing analytical capacities has significantly facilitated innovation across many levels of business models. Consequently, effective management and expertise inside corporate organizations have emerged as crucial factors contributing to competitive advantage across almost all sectors of the economy [2]. Nevertheless, the breadth of digital transformation is extensive, and several factors, including the information system resources of a corporation, the industrial landscape, and governmental legislation, influence its prevalence. The proliferation of digitalization in the corporate sphere has engendered a range of options that are reshaping the competitive landscape for organizations. This transformation is evident in firms' altered attitudes, interactions with workers and consumers, and strategic positioning within the market [3].

II. Literature Review

Industry 4.0 is gaining prominence since it encompasses many technologies associated with digitalization, networking, and automation in corporate operations. The technologies included in this category consist of the Internet of Things (IoT), cloud computing, big data, artificial intelligence, the latest iteration of bots, and blockchain technology. Business processes are undergoing simultaneous evolution with technological innovation. The advent of smart devices accompanies a growing emergence of novel business models. This trend necessitates a transition towards digital services and service manufacturing. In the current business landscape, supply chains progressively enhance their agility and resilience by exchanging consumer and supplier data and sophisticated analytics [4]. Industry 4.0 technology and activities provide several operational benefits and present competitive potential. Nevertheless, managers encounter many novel issues, with cyber security emerging as a paramount concern swiftly ascending to the forefront of their priorities. The reliance on data and information technology has become more crucial for business operations, with the supply chain facing heightened vulnerability in the present context. The media has documented several significant assaults concerning statistics, leading business managers and executives to recognize the need for enhancing specialist skills to safeguard cyber security in our progressively interconnected society [5]. There has been a noticeable emergence of cybersecurity specialists, particularly within significant enterprises. Ensuring the security of a company's business operations involves effectively managing strategic choices that align organizational practices and facilitate interactions with external stakeholders [6]. In his work, Hermann presents a comprehensive and substantiated elucidation of Industry 4.0, whereby he describes it as a broad phrase including several technologies and ideas related to the structure of value chains. In the context of Industry 4.0, modular smart factories are equipped with cyber-physical systems (CPS) that oversee and monitor physical activities. The proposal involves the development of a virtual representation of the physical world, whereby decentralized decision-making is facilitated via the use of the Internet of Things (IoT). This entails the establishment of a network wherein Cyber-Physical Systems (CPS) may effectively interact and cooperate, as well as with human entities, in a real-time manner. The Internet of Services (IoS) facilitates the provision and use of internal and cross-organizational services by actors within the value chain. Based on the above definition, there are four intermediary components or Key Technologies in Industry 4.0 Smart Factories: the Hyperphysical System, the Internet of Things, and the Internet of Services [7]. Industry 4.0 refers to a transformative procedure whereby the factory engages in intelligent and direct interactions with machines to manufacture completed and semi-finished items commonly used in operational activities. This situation facilitates cost-effective and streamlined manufacturing processes that prioritize customer satisfaction beyond the scope of the Industry 4.0 paradigm. Industry 4.0 is a dynamic and adaptive concept that undergoes continuous transformation and is characterized by its interactive and intelligent nature. It is important to note that Industry 4.0 is not a self-contained system but a fundamental component within a broader framework. As mentioned above, the structure extends beyond a conventional factory's confines and operates as a cohesive system. By its sophisticated technology, it facilitates the interconnection of the principal sectors throughout the globe. With the advent of Internet of Things (IoT) technology and its associated services, it is possible to establish connectivity between networked systems inside a factory and integrate them into a broader hierarchical structure, ultimately extending their reach to a global scale. Hence, a diverse range of integrity is seen across several domains, including energy, health, logistics, and the building sector. The integration of diverse systems, such as intelligent buildings and residential areas, sustainable energy sources, efficient logistics for transportation, and high-quality healthcare services, are critical components of this comprehensive framework [8].

Cyber-physical systems (CPS) facilitate the establishment of seamless connections and effective communication channels between individuals and intelligent manufacturing facilities. Cyber-Physical Systems (CPS) provide the seamless integration and interaction between intelligent individuals and industrial facilities. The concept of Industry 4.0 entails the integration and coordination of autonomous systems within the industrial sector to function holistically. Integrating many systems will facilitate vertical integration across several functional areas, including research and development, manufacturing, data processing, finance, sales, and marketing. Consequently, integrating production process data into planning and control processes will be facilitated using methodologies such as cloud computing and data analysis. The ongoing advancements in Industry 4.0 are expected to drive a surge in the need for individuals with the intellectual capacity to comprehend and effectively use this technology [8]. Industry 4.0 has certain benefits, but it also gives rise to many challenges. The use of robotics technology has also engendered the concern of imposing taxes on these automated machines. Production system monitoring facilitates fault diagnosis, enhances system and component self-awareness, promotes the adoption of resource-saving and environmentally friendly practices, improves production efficiency, enhances production flexibility, ensures uninterrupted production, and reduces production costs. Consequently, this has led to new developments, such as the

advancement of service and business models. Conversely, the prevalence of automated manufacturing has resulted in several advancements, like less reliance on human labor and a decrease in the number of personnel inside organizations. The emergence of artificial intelligence (AI) within the context of Industry 4.0 has prompted discussions over the potential dominance of self-programming and self-designing robots in future manufacturing processes [9].

The influence of Industry 4.0 on the field of accounting is substantial and inevitable. The accounting profession is anticipated to undergo significant evolution by 2025, driven mainly by advancements in business, politics, technology, and, notably, the evolving public expectations around the profession—Islam outlined three primary issues that future accountants face. The anticipated changes that will impact the practices of accountants include the advancement of intelligent technology, the worldwide adoption of financial reporting or disclosure standards, and the implementation of new and expanding regulatory frameworks. The Industry 4.0 change requires heightened attention and adaptation from accountants to fulfill stakeholder expectations. To adapt to the advancements of Industry 4.0, the accounting field must transition from its conventional techniques to automated and methodical procedures throughout most domains. The significance of technology and digital convergence cannot be overstated. Artificial intelligence within the accounting sector is an inevitable trajectory, which is anticipated to engender favorable advancements and foster innovation within the business [10]. The advent of Industry 4.0 has the potential to revolutionize conventional procedures by introducing contemporary and intelligent approaches. The system will undertake the organization and digital processing of financial data, while the accountant's responsibility lies in evaluating the data generated by the system [11].

The proliferation of intelligent goods resulting from advancements in Industry 4.0 technology has significantly transformed shared value creation and the services industry [12]. Smart objects include a range of interconnected sensors and Internet-enabled gadgets that facilitate data acquisition, storage, and processing. Additionally, they provide remote cooperation between service providers and clients. Bright goods have a transformative impact on how suppliers engage with their consumers, thus giving rise to novel business prospects. One such instance is the potentiality of delivering pioneering industrial services, sometimes called intelligent services [13]. Innovative services refer to integrated systems of product services that rely on smart devices for delivery. This implies that providers use intelligent goods to gather and analyze consumer data to enhance their service offerings and fulfill the personalized requirements of their clientele. In this context, service providers and consumers collaborate inside product-service systems to generate reciprocal advantages. Hence, using intelligent goods facilitates the collaborative generation of intelligent services [14]. The integration of novel services into the process of shared value creation entails both challenges and opportunities for stakeholders. Consequently, to capitalize on emerging business prospects associated with intelligent services, organizations must surmount various barriers, including limited capacity, inadequate resources, and resistance to change [15]. In addition, using intelligent services raises concerns over consumer data privacy since providers of bright goods may access the customer's sensitive information beyond the boundaries defined by the service agreement [16]. Therefore, to effectively capitalize on the transformative prospects of Industry 4.0, managers need to be equipped to navigate the associated complexities and obstacles. Despite the statement above on the transformative impact of Industry 4.0 technologies on the service industry, there has been a noticeable lack of scholarly focus on examining this subject matter.

The current stage of industrial growth, often called Industry 4.0, necessitates organizations to enhance the pace of production via technological advancements. Using costly technology impacts the need for accurate financial statements generated by organizations with minor information asymmetry between information-seeking agents and managers possessing such information. The high quality of financial data significantly impacts the efficiency of investments [19]. Hence, implementing cost-effective investments may mitigate the repercussions of high-cost industrial advancements. Furthermore, the reduction of information asymmetries may be achieved by providing both financial and non-financial information. The collapse of Lehman Brothers in 2008 catalyzed the global economic crisis. Consequently, there is a need for comprehensive information that encompasses both the financial and non-financial aspects of the organization. Such integrated information is crucial for enhancing the long-term and short-term value of the company. In this discussion, "long-term" refers to a significant period. This assertion is supported by Lambert et al. [19], who argue that investors cannot effectively disentangle financial and non-financial information when making company choices. The International Integrated Reporting Council (IIRC) addressed this information challenge by introducing a new reporting framework in 2011 called Integrated Reporting. The primary objective of the Investor Relations Framework is to establish a connection between an organization's strategy, governance, financial performance, and corporate social responsibility within the context of its economic activities. This framework facilitates understanding how companies shape their short-, medium--, and long-term values, proving highly valuable for decision-making processes by capital providers. Currently, the IR framework does not possess a prescriptive nature. To generate reports for multinational corporations operating in diverse nations, it is essential to consider the regional disparities that significantly impact the choice to use the Internal Revenue Service (IRS) for disclosing the company's operations [20].

According to the International Integrated Reporting Council (IIRC, 2013), an integrated report is a concise summary that outlines the functioning of an economic entity's strategy, governance, performance, and prospects. Within the framework of its external environment, which contributes to the generation of value for the entity over the short, medium, and long term. The principal objective of integrated reporting is to showcase to capital providers and stakeholders vested in the company's capacity to generate value over an extended period. Massingham et al., 2018:16 defined it as providing insight into the resources and relationships used and affected by the company. Explain how the unit interacts with the external environment and capital to create short-, medium-, and long-term value. The current innovation in corporate

reporting is designed to overcome the alleged criticisms and limitations of corporate reporting so that the reports are more relevant to users and stakeholders. And that the primary goal of IR is to improve the information provided to them and provide an excellent service to financial analysts. Integrated reporting aims to analyze the firm's operations within the external environment. It will include an overview of the organization, including its activities and the circumstances in which it works. Additionally, this report will serve as a platform for the company to articulate its goal and vision while shedding light on its economic unity, ethics, and values culture. The topic of discussion pertains to the concepts of ownership and operational organization. This paper examines the primary operations and markets, the competitive landscape, and the prevailing market condition.

The company's value is the primary and essential indicator of the evaluation of the company as companies strive to increase their value. It is considered one of the most important elements companies and investors care about. Investors' views and perceptions of companies are often linked to stock prices [21], which is the condition that they fulfill The company as an image of public confidence in the company through the operations and activities carried out for several years since its inception. The assessment of a company's worth has significant importance as it indicates its success, hence influencing the perception formed by investors [22]. The valuation of a company can be determined by either its potential for selling the company or its growth potential and increased returns for shareholders. This valuation is manifested in the market price of its shares, with higher share prices indicating more incredible wealth for shareholders. Additionally, investor perceptions of the company are often associated with its share prices [23]. It is the value required of investors to make investment decisions that are reflected in the company's market price.

III. Data and Method

The research population covers the private commercial banks listed in the Iraq Stock Exchange to study the research variables. The number of banks listed in the (regular market) of the Iraqi Stock Exchange is (21, which will continue until the year (2020). The researcher relied on (15) continuous commercial banks as a sample for the research, which constitutes (71%) of the research community. The inductive approach was relied upon in reviewing the accounting literature related to integrated reporting to enrich the research's theoretical aspect. And a deductive approach to detecting and measuring the impact of integrated reporting on company value. The content analysis approach was adopted in examining the annual reports of banks listed on the Iraq Stock Exchange (2011-2020).

IV. Results

To evaluate the validity of this hypothesis, a linear regression model was developed:

$$FV_{it} = b_0 + \text{IR} + \varepsilon_{it}$$

Using the SPSS statistical program, the results were as follows:

TABLE I. Summary Summary of the Hypothesis Testing

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.578a	.334	.329	.819
a. Predictors: (Constant), IR				
b. Dependent Variable: FV				

The table presented the model's results, indicating that the variables' correlation coefficient (R) was 0.578. Additionally, the coefficient of determination (R Square) was found to be 0.334, and the standard deviation of the Estimate error was calculated to be 0.819.

TABLE II. Hypothesis Test Variance

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	49.739	1	49.739	74.162	.000
	Residual	99.261	148	.671		
	Total	149.000	149			

The table above displays the results of an Analysis of Variance (ANOVA) test. The calculated F value is 74.162, which exceeds the critical F value of 3.84 at a significance level of 5% and degrees of freedom (df) of 148.1. The significance level (Sig) is also 0.000, significantly lower than the predetermined error value of 0.05 commonly used in social sciences. These findings suggest that the statistical model employed in testing the hypothesis is appropriate. The shown graph substantiates the association between the two variables using the dispersion pattern, as the upward trajectory of the curve signifies a positive correlation between integrated reporting and corporate value.

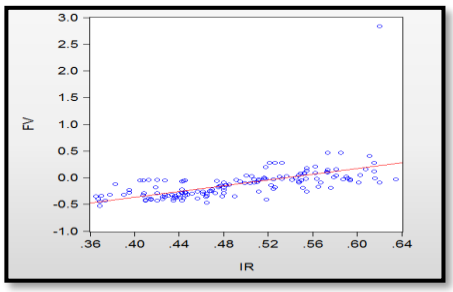

Fig. 1. Direction of the relationship between integrated reporting variables and firm value

The histogram shown in Figure 1 illustrates the normal distribution of the statistical residuals derived from the regression equation, hence indicating the precision of the preceding regression model. The graph in the figure illustrates the graphical representation of the conditions met in the regression analysis test. It displays the dispersion of data points around the linear regression line. This visual representation proves that the statistical residuals conform to

a normal distribution. Consequently, it indicates no substantial deviations in the disparities between the observed values of the dependent variable and their corresponding predicted values based on the regression equation model employed in hypothesis testing. As a result, this signifies the precision and reliability of the model.

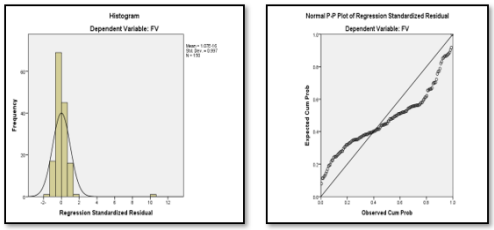

Fig. 2. Histograms and regular distribution of hypothesis residuals

V. Conclusions and Discussion

The primary objective of this research was two-fold: firstly, to ascertain the many possibilities and problems arising from Industry 4.0 concerning the co-creation of value within industrial services. Secondly, this paper presents a proposed theoretical framework for innovative industrial services systems. We conducted a systematic literature review (SLR) and used content analysis to accomplish both objectives. Using a two-stage research methodology facilitated the identification of five distinct possibilities and five corresponding problems regarding the co-creation of value in industrial services within the context of Industry 4.0. According to a recent study, Industry 4.0, often known as the intelligent factory, has many benefits and downsides for enterprises. One of the benefits associated with Industry 4.0 is providing a manufacturing process devoid of errors, facilitating the prompt and flawless delivery of goods to clients. This phenomenon offers several advantages to businesses, such as reduced labor, production, and time costs. However, it also gives birth to unfavorable consequences, such as increased unemployment rates. Accountants are considered one of the occupations anticipated to have unfavorable impacts. Accountants' involvement in routine operational activities is anticipated to diminish, with a shift towards their engagement in more substantial responsibilities such as optimizing resource allocation, formulating long-term plans, and overseeing monetary policies. However, the extent to which these outcomes are realized will depend on the accountants' adherence to IT compliance and capacity to engage in competitive activities. The findings indicated that the level of disclosure in the integrated reports produced by the firms in the sample was relatively high, even in the absence of regulatory mandates for disclosure. The manager's knowledge of the effect of information asymmetry, which may diminish stakeholder trust, is crucial. Furthermore, the results of hypothesis testing revealed a significant favorable association between integrated reporting and corporate performance. The comprehensive scope of content included within the integrated reporting framework establishes a robust connection between stakeholders and managers, enabling the evaluation of the potential benefits and drawbacks of each adopted strategy. Consequently, this evaluation process directly influences the overall performance of the organization. Hence, our research results strengthen the significance of investigating the influence of intelligent goods on the body of knowledge about services. Furthermore, our research emphasizes the need to investigate the obstacles associated with identifying strategies to alleviate these issues, enabling the maximization of the potential offered by smart objects. Furthermore, a scarcity of research has addressed the concept of Industry 4.0 within the context of the industrial services sector. Limited research has been conducted on service technology developments about business-to-business partnerships and the dearth of frameworks that adequately address the administrative challenges associated with executing operations and facilitating resource sharing in intelligent services. The results of our study address the gaps above in the literature.

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