

# The Impact of Technological Changes on Small and Medium Enterprises in Vietnamese Organic Food Industry

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## ABSTRACT

This paper examines the impact of technological change on SMEs operating within the Vietnamese organic food-producing industry. The literature review manifests that demand for organic food is exponentially rising as day follows night due to various reasons such as nutritional benefits, low chemical residues in such food, and its environmental-friendly ambiance. Nonetheless, the Vietnamese SMEs are found to be the drivers of growth for the emerging economy, and technology is at the heart of the exemplary performance of the country's organic food sector SMEs. Since the agricultural potential of organic food production is not the product of one technology, but of multiple applied technologies such as artificial intelligence, robotics and data analytics, these technological changes have been dubbed the "fourth industrial revolution". The results of the study indicate that in being found to have the potential for the Vietnamese organic food industry SMEs can unlock huge out of its development potential through precision agriculture, blockchain technology, smart greenhouse technology, etc. The conclusions of this paper will have the effect of helping the Vietnamese organic food industry to unlock its market potential, thereby contributing to the development of the local economy.

**Keywords:** SMEs, Vietnamese, Food-producing industry, Technologies, Opportunities

## 1. INTRODUCTION

### 1.1. Research Background

One of the most observable trends in current food consumption globally is the elevated consumer demand for organic foods. From China to South Africa, organic food consumption is increasing at a prodigious rate as day follows night. According to an observation drawn by Nguyen et al. [1], this elevated observable trend of increased purchases of organic food could be due to various reasons: increased awareness among consumers that organic foods contain relatively low chemical residuals compared to GMOs and other food types. Today, the organic food market is arguably the fastest growing market within the contextual placement of the contemporary food industry [2, 3]. The demand for organic food is growing at a snowballing rate, and the developed countries are no longer the only consumers of this type of food. Developing countries and emerging economies take to this type of food like a duck takes to the water for several reasons. A notable observation of

this new food consumption trend is evinced in a recent move by the Chinese government that saw it adopt a holistic food certification system intended at promoting food safety along with three food production levels of organic food, safe food, and green food with organic food production being at the heart of this certification [1]. Consumers worldwide have increasingly considered organic food their preferred dietary component majorly due to its various acclaimed health benefits, innovation of producing technologies, its food safety-orientation, a high nutritional value, and elevated knowledge regarding its benefits [2]. Against the backdrop of increased consumer awareness of organic food's various health and nutritional benefits, different investors see investment in organic-food-producing small-and-medium-term organizations (SMEs) as an area worth exploiting. Vietnam is one of the world's countries that have witnessed a recent surge in the rise of SMEs whose activities revolve around the production and processing of organic foods. In the process of technological revolution, technology not only affects the size of the enterprise, but also plays a significant role in the

management change of the enterprise. The cycle of technological progress from quantitative change to qualitative change to quantitative change makes the evolution of technology characterized by spiraling and shortening cycle.

1.2. Research Significance

A detailed examination of the Vietnamese organic food industry reveals that it is increasingly dominated by SMEs harnessing emerging technological innovations to take advantage of the increasing demand for organic foods within and outside the nation. Nguyen et al. attribute the elevated demand in the Vietnamese market to such factors as its environmental-friendly mien, its nutritional capabilities, food safety reputation, and its reputation regarding consideration of animal rights as chief factors heightening the demand for organic foods [1]. The Vietnamese organic food industry is fast-growing, which has considerably contributed to the country's economic growth in recent years. One view contends that it is a result of the diversification of exports and by meeting the population's needs. The employment created in the agri-food processing sector in Vietnam is also instrumental in raising the economy and improving the people's well-being. As product innovations and technological advancement increase exponentially in Vietnam, there is an increasing need to look at how such transformation impacts small and medium enterprises (SMEs). Despite the theoretical aspect of technology in business, less research has been done on the practical importance of technology on SMEs in the organic food industry [4]. In that regard, therefore, it is worth noting that this is an illustrious research gap that this specific research intends to examine and fill in a bid to advance the existing body of knowledge on technological implications on the Vietnamese organic food industry.

Thus, it is crucial to develop a research question that will guide the study to get a better conclusion for the research.

2. LITERATURE REVIEW

2.1. The Forth Industrial Revolution Concept and Suitability of SMEs to this Study

A meticulous examination of the diagrammatic representation above reveals that technology has been evolving over time and that the forth industrial revolution which is the subject of interest within the purview of this paper is not a standalone concept but one that entails technological evolution across time. As can be observed from the diagram, the outside thread labelled 1.0 to 3.0 reveals the developmental journey that technology has undergone over time. For instance, 1.0 manifests the mechanization technology which constitutes the first industrial revolution encompassing such components as the railway line, steam power and waterpower which are associated with the technologies of the second part of the 18th century and early 19th century. 2.0 reflects the second industrial revolution which is associated with assembly lines and mass production powered by the electricity of the late 19th century and early 20th century [5]. 3.0 reflects the third industrial revolution associated with automation and the advent of computers beginning in the 1960s. 4.0 which is the subject of interest for this paper is also acknowledged by Unwin as the 'cyber-physical systems' constituting the amalgamation of the digital, the physical and the biological spheres having taken off in the early 21st century [5]. The sections following this explore how the forth industrial revolution (4.0) has played a role in the progression of the SMEs operating within the Vietnamese organic food industry[6].

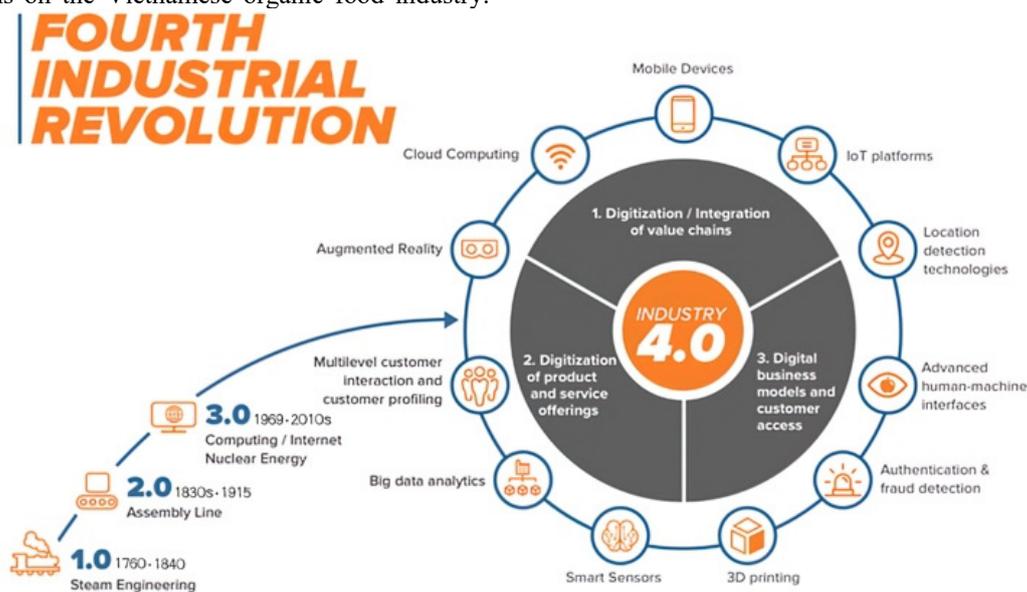


Figure 1 The Forth Industrial Revolution in a diagrammatic representation[5]

It is worth noting that the growth capacity for trade and commerce in developing and emerging markets is sheathed within the garb of what is christened the 'fourth industrial revolution.' None of the growth areas in developing and emerging markets such as Vietnam is destined to benefit from such technological revolution other than the organic food industry, which arguably stands to gain the most. By fourth industrial revolution, it is implied a technological revolution that blends emergent technological breakthroughs such as artificial intelligence, the internet of things, genetic engineering, robotics, quantum computing, data analytics, and other technologies to blur known boundaries separating the digital, physical, and biological purviews [7]. In this light, it becomes manifest that the best way to examine technological advancements in their recent resurgence is by viewing them within the contextual sheath of what Mirkes et al. refer to as the fourth industrial revolution [7]. According to a view posited by Song et al., SMEs have emerged as the ground zero for chiseling the application of the fourth industrial revolution, more so within the purview of the organic food industry at the global level [8]. Nghia and Dung observe that the fourth industrial revolution is a new development with tremendous promise and growth potential to significantly elevate the world's levels of income through trade by utilizing the best emergent technologies of the day [9]. It wields the capacity to cause a supply-chain success story within the organic food industry by harnessing technological innovation to underscore long-term productivity and efficiency in SMEs indulging in organic food production and processing [10]. In this light, it becomes manifest that the Vietnamese SMEs engaging in the show, processing, and sale of organic food are destined to benefit big time by holistically leveraging the opportunities provided by the fourth industrial revolution and its various technological tools.

The importance of SMEs in this study is informed by the fact that they are arguably the drivers of growth, particularly in the developing economies and partly in emerging economies such as Vietnam. Before delving into a detailed discussion into the implications of technology changes on SMEs operating within the Vietnamese organic food industry, it is particularly important to explore the importance of SMEs to the economy of Vietnam in the first place. Driven mainly by recent government reforms, particularly in agriculture, it is worth noting that SMEs in Vietnam are arguably the hubs for nurturing innovation in the country's organic food-producing industry [1]. Within the Vietnamese organic food industry, it is worth noting that SMEs seek to tremendously benefit from technological developments such as those masked within the larger fourth industrial revolution phenomenon.

## ***2.2. Important Technological Applications for SMEs in Vietnamese Organic Food Industry***

It is worth noting that the fourth industrial revolution wields significant implications for the development of SMEs operating within Vietnam's organic food industry. According to an observation made by Thao et al., it wields a huge promise, particularly the opportunity it offers SMEs to elevate their trading levels via enhanced supply chain efficacy [11]. Diep and Anh further aver that this technological avenue (the fourth industrial revolution) offers Vietnam-operating SMEs the opportunity to bypass the conventional stages of industrial development, thereby approaching development more efficiently by skipping the more resource-consuming developmental stages [12]. Among the most notable agricultural technologies of the fourth industrial revolution, the SMEs operating in the Vietnamese organic food industry could harness such innovations as precision farming and livestock monitoring [1,13]. Considering that the concept of sustainable livestock farming practices has raised the bar on animal wellness, livestock monitoring innovations are increasingly becoming a significant focus area in the Vietnamese organic food production context. The rationale is that animal illness is one of the most pressing impediments to the generation of sustainable profits by animal farmers, thus elevating the significance of this technological application to contain the animal illness problem [14]. Through the efficient monitoring of animal-oriented vital systems, it is worth noting that the livestock monitoring technological development holds relatively great importance to the profitability of SMEs initiatives of Vietnamese organic food-producing farmers. On the other hand, precision farming is an important technical application with the greatest potential for enhancing crop production through improved data integration for easing operational efficiency. According to a view postulated by Sae-Lim and Jersittiparsett, it holds the capacity of applying recent advancements in information technology in creating, processing, and analysing data of relatively high temporal and spatial resolution from multiple sources to enhance crop production through easing the decision-making process [15].

Not to be left out of this discussion on important technological innovations that benefit SMEs engaging in organic food production in Vietnam is another component of the fourth industrial revolution known as the application of smart greenhouses. According to an argument posited by Lang et al., the smart greenhouses are a recent technological breakthrough that blends systems already applicable in conventional agriculture with the myriad opportunities offered by the internet of things for purposes of enhancing crop yields and ensuring crops are well protected. It is a revolutionizing activity with the capacity to increase SMEs' efficiency levels via

the inculcation of methods with the power to establish a self-regulated microclimate that enhances the growth of crops. It does so via the integration of recent developments in technology vivid in the application of sensors, systems of monitoring, and agricultural control and actuators with the propensity for optimizing crop growth-oriented conditions through automated growth [16]. A meticulous examination of smart greenhouses and their application in organic food-producing SMEs in Vietnam reveals that it is the epitome example of the fourth industrial revolution in agriculture because it blurs the known boundaries among the biological, physical, and digital worlds. The aftermath of the application of this technology by Vietnamese organic farmers of rice, cassava, and other organic foods is what Nam and Wei, in consensus with Van Huy et al., refer to as technology's ability to unlock emerging market-oriented opportunities [4,17]. It follows that the application of this smart greenhouse technology by Vietnamese organic food farmers enables them to have good yields, thus implying that such technology can fuel growth beyond the national borders [18]. In specificity, it is important to underscore that the smart greenhouse technology in agriculture achieves better organic food yields via the optimization of crop growth processes.

The benefits of the fourth industrial revolution in agriculture are numerous and cannot be understated in impacting SMEs' growth within the Vietnamese organic food industry. The rationale is that it utilizes the smart collection concept via the concurrent application of real-time agricultural data through elements networking, the result of which is eased agribusiness operations, elevated efficiency, and long-term reduction in agri-business costs [19]. It unlocks new market opportunities for organic food-producing SMEs by integrating diverse technologies, which create the opportunity to tap the resultant decentralized, intelligent and autonomous factory breakthroughs via benefitting from the integrated agri-economic services and products [17]. According to Padel et al. and Jones and Pimdee, some of the technologies organic food-producing SMEs in Vietnam can tap from the fourth industrial revolution's empowerment potential include the internet of things, robotics, big data, and among others, the smart greenhouse farming technology [20]. The rationale is that the fourth industrial revolution benefits the organic food industry in Vietnam via the provision of an integrated farm operations system which enables the digital collection of information on all farm-oriented sectors for the processing, which yields cost minimization, output elevation, and enhanced controlled operations [21]. It achieves agribusiness control via integrating the Hi-tech farms, which are strategically designed to accomplish enhanced organic food production through a stepwise process that entails the use of detection and decision rules after execution and assessment [8,22]. It implies that organic farmers in Vietnam are empowered with the

capacity to gain optimized yields by harnessing such opportunities as enhanced soil conditions, regulated sunlight hours, and a controlled climate which holistically contributes to beneficial opportunities to be tapped [2,3,23]. The integration of comparative strengths of automated systems of detection (sensors) is key in determining recommended variations in animal, crop, and soil behaviour. Nonetheless, it is worth noting that the translation of such variations into actionable solutions is best achieved through GIS mapping, which enables geo-referencing besides enabling the integration of decision support systems and utilization of concurrent decision models and rules with the capacity to achieve desired fetes [9]. In this light, it is manifest that SMEs engaging in organic food production, processing, and selling in Vietnam stand to benefit greatly from the opportunities curved out by technological innovations within the wider fourth industrial revolution corpus.

According to research done by Kushwah et al. (2019), organic food consumption has been highly dependent on how the customers have been engaged in the marketing process [24]. With the advancement in technology, the chances are high that more customers would be reached and be aware of specific organic food products. However, there exist some barriers in terms of misleading information posted online due to exaggeration. The research considered the evaluation of 89 research studies to determine the motives and barriers of the consumption patterns in the organic food sector. Another research was done by Cullen et al. (2018) to show how plasma technology has been applied successfully in the organic food industry [25]. Keeping organic food fresh has been the objective of most plasma technological developments, making transporting goods from one place to another [16]. Similarly, in food manufacturing, cold plasma is pursued in atmospheric pressure, and the outcomes are highly instrumental in determining the uptake of organic food products [3]. In the past, the manufacturing process faced many problems which resulted in contamination as the cold plasma had not been adopted as one of the technological know-how.

On the other hand, Van Hilten et al. further elaborate how blockchain technology has been used in the organic food industry to ensure that fair-trade or organic food are easily traced from the farm all the way to the stalls [26]. It is done while maintaining a focus on the European regulations. Thus, the study aims at evaluating the challenges and opportunities in the use of this technology. The use of a case study approach was instrumental in determining the success of blockchain technology [20]. The findings in this research are similar to what was covered by Vieira & Hope, whose focus was the technology used in the production process and the controls made in transporting and storing the organic foods [23]. Despite the research done, there is a gap that needs to be bridged based on how new technology can be applied in the organic food industry in the production of

quality organic foods which are safe for human consumption [27]. It also trickles down to the marketing and distribution of organic foods in the respective markets.

### 3. RESEARCH DESIGN AND METHODS

In order to collect reliable data for the research, qualitative techniques will be used since they aim at picking the opinions of the key players or firms in the organic food industry in Vietnam. The use of questionnaires administered through emails will be embraced. Additionally, telephone interviews will help in reaching out to the participants. A sample of Vietnamese firms dealing in the production and supply of organic foods will be picked randomly. Each of the heads of the marketing and production departments will be determined in each of the selected firms, which will be 40 in number as 20 will be the sample size of the firms considered to take part in the study. The questionnaires will also be administered to the respondents so that crucial information will be obtained regarding the contribution of the changing technology to the welfare of the organic food industry [28]. After the data is collected, it will be subjected to data analysis using SPSS and Excel to attain a conclusion. One of the limitations during the data collection will be the low response rate of emailed questionnaires. So, to deal with this, a follow-up through telephone calls will be adopted. Another issue is that not all firms in the organic food sector use similar technology since some might still be stuck in the traditional production, storage, and sale of organic foods. This research will offer better views regarding the technology suitable for firms in the organic food sector. The policymakers in the industry will also be given a better platform to develop some of the most successful ways of making the firms in Vietnam to gear up towards increasing production and observing safe ways of producing and distributing organic foods. Through social media, marketing can also be improved significantly as per the results obtained from the research.

### 4. CONCLUSION

This paper revolves around the impact of technology-oriented changes on small and medium-sized enterprises (SMEs) operating in the organic food industry in Vietnam. The results of the literature review indicate that there is an increasing trend in the consumption of organic food by customers who have more demand for this most sought-after food type. The demand for organically grown food is increasing due to the increased level of awareness about the upcoming benefits of consuming organic food. Other notable reasons behind the continued trend of growing demand for organic foods include their highly regarded nutritional benefits, as well as their relatively low chemical residues, which are at an all-time high in genetically modified foods.

In addition, this paper seeks to explore how the technological revolution has been effective in enhancing the performance of organic food production and distribution as well as the customer experience in Vietnam. The results show that the application of technologies such as blockchain technology, smart greenhouse technology, precision agriculture, and livestock monitoring are more effective in improving the production and marketing of SMEs, while robotics, quantum computing, artificial intelligence, big data analytics, and other biotechnology-related advances are also helping to tap into emerging market potential.

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