SME Business Model for Industry 4.0

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Abstract **–** Ongoing technological development pushes industry towards and recent developments in production processes and their automation have led to the definition of the Fourth Industrial Revolution, commonly known as "Industry 4.0". Considering new technology as a determinant of future business environment, we find it necessary to examine how platforms such as Industry 4.0 will change enterprises organization and business models. Designed model should serve as guidance for new and also already existing enterprises for implementing of Industry 4.0 required attributes especially in early stage. SME is an abbreviation for small and medium-sized enterprise, sometimes seen as small and midsized enterprise or business. Main emphasis is given on software and cloud solutions that will become necessary despite the fact that in recent industrial SMEs they do not play significant role. Such transformation will raise crucial questions about funding new technologies. We explore how small and medium-sized enterprises (SMEs) engage in innovation.

Keywords **– Industry 4.0, SME, Business Model, Mass customization, Performance Indicator.**

Introduction/Situation/Phenomena

The changes in politic, economic, social, culture, environment and especially technology have brought many transformations in the business world. The availability of information and communication technology (ICT), especially the internet, has an impact on the practice business. ICT also known as Digital Technology. Digital technology includes all types of electronic equipment and applications that use information in the form of numeric code. This information is usually in *binary code*—that is, code that can be represented by strings of only two numeric characters. These characters are usually 0 and 1. Devices that process and use digital information include personal computers, calculators, automobiles, traffic light controllers, compact disc players, cellular telephones, communications satellites, and high-definition television sets. (technologyin.org).

Telecommunications has relied on digital methods to transmit messages. In the early 1980s, enhanced fiber optics enabled the development of digital communication networks. Digital technology replaced analog signals for many telecommunication forms, particularly cellular telephone and cable systems. Analog-to-digital converters utilized pulse code modulation (PCM) to change analog data into digital signals. Compared to analog transmissions, digitized signals were less distorted and could easily be duplicated. (www.encyclopedia.com).

The industrial revolution 4.0 has shifted the boundaries with blurry technology between the physical, digital and biological worlds the first Industry Implementation 4.0 was initiated by Germany. Cyber security needs to move beyond data confidentiality protection to ensure

availability, data integrity, support for innovation and security. The development of incredibly fast digital technology, various applications can be easily found and downloaded through cloud services and digital business platform technologies. When entering Industry 4.0, it must begin as quickly as possible to map and implement the digital revolution, if not, the business will lag far behind. Now or never. This digital revolution is a necessity, many have started, and Indonesia's infrastructure is far more ready. While the challenge is that competition is increasingly open, how to open market opportunities, can be adopted with the Y generation (millennial). Industry 4.0 is a term for the so-called Fourth Industrial Revolution and in essence means the technological integration of cyber-physical systems (CPS) in the production process. CPS enables (internet-based) networking with all participants in the value creation process.

Digital revolution because it is at the heart of the overall transformation of the Value Chain. Successful digital re-creation will involve a fundamental re-drawing of how an organization operates and interacts with its surrounding environment. Industry 4.0 digitizes and integrates processes vertically throughout the organization, from product development and purchasing, through manufacturing, logistics and service. All data that includes the operations process, efficiency processes and quality management, including operational plans are available in a timely manner, supported by augmented reality and optimized in an integrated network.

Digital transformation is now no longer optional as the use of data analytics is increasing, the increasing number of smarter products that use software and sensors, as well as the analytics needed to maintain the cycle applied by market leaders and provocateurs. So, for companies, the choice is to be a provocateur for changing the status quo or being disturbed by those who adopt digital technology.

Organizations throughout the world are undergoing a transformation driven by cloud computing, artificial intelligence (AI), mixed reality and the Internet of Things. These technologies help businesses and communities to achieve new things - the retail industry becomes more personal, the banking industry becomes more connected and the health industry becomes more predictive and preventive and improves the quality of Human Resources.

Despite the enormous economic potential of Industry 4.0 SMEs in industry remain relatively cautious about it. With regard to individual Industry 4.0 processes and technologies, however, it appears that across the board, regardless of company size and branch, little use is made of the evaluation of large data streams to optimistic processes or for downstream services. Accordingly, little use is made also of higher level cloud services that are useful for that purpose. It is not easy for small and medium-sized enterprises, due to lack of resources, to assess the technological maturity of the relevant solutions and their business uses, transform familism into professionalism, entrepreneurialism to win the competition creatively.

Management lacks a methodical approach to implementation. A lack of standards and norms with regard to interface technologies is another reason why investments in the integration of IT systems are either not carried out or delayed.

Literature Review

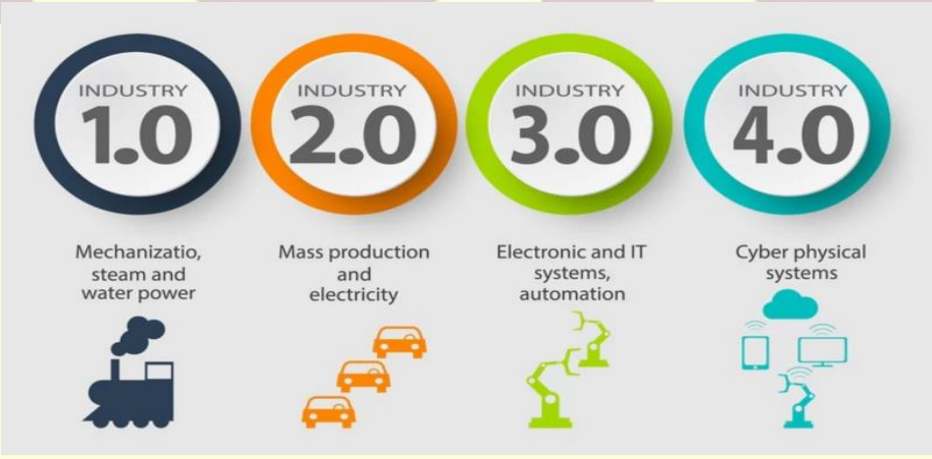
Digital technology includes all types of electronic equipment and applications that use information in the form of numeric code. This information is usually in *binary code*—that is, code that can be represented by strings of only two numeric characters. These characters are usually 0 and 1. Devices that process and use digital information include personal computers, calculators, automobiles, traffic light controllers, compact disc players, cellular telephones, communications satellites, and high-definition television sets. (technologyin.org).

Major changes in business dynamics are increasingly fast, the data generated and readiness to access technology in human life, is a characteristic of the industrial revolution 4.0.

For companies, digital transformation is now something very important to do. Digital transformation is now no longer optional as the use of data analytics is increasing, the increasing number of smarter products that use software and sensors, as well as the analytics needed to maintain the cycle applied by market leaders and provocateurs. So, for companies, the choice is to be a provocateur for changing the status quo or being disturbed by those who adopt digital technology. Businesses that can expand the data supply chain have a competitive advantage in the digital economy. Outperform business competitions with visibility of real-time inventory anywhere with cloud inventory services and mobile-first supply chain apps. Applying on premise or in the cloud to get info, share, analyze and act on the investment of mobile devices. Cloud inventory services and mobile-first supply chain apps can help expand business capabilities with flexible solutions to meet unique business challenges.

Changes in the world of work, yes; job losses, no Worries that automation is leading to major job losses in Germany are largely unfounded. Industry 4.0 can unfold its potential only by means of the practical knowledge, acumen and adaptability of employees. While it's true that simple repetitive work is increasingly being replaced new jobs are emerging elsewhere due to new business models. The challenge for small and medium-sized enterprises is to create flexible organizational structures and to boost their employees' interdisciplinary thinking. Employees' existing qualifications and experience thus have to be deployed in the introduction of Industry 4.0 and enabled to reflect on production processes and to bring about continuous improvements. Industry 4.0 requires a reallocation of tasks and new responsibilities that need to be underpinned by appropriate further training measures, as well as consensus-oriented concepts of data protection and mobile work, which have to be developed with the participation of workplace codetermination bodies.

Industry 4.0 (Industrie 4.0) is a synonym for the fourth industrial revolution. The term originated with a future-oriented project that was part of the German government's high-tech strategy. Germany offer a good starting position and has substantial technical knowhow with regard to numerous Industry 4.0 technologies and a well-educated and trained workforce. The framework conditions have improved in the past year as a result of state promotion of Industry 4.0 technologies and cross-cutting issues, as well as support measures for implementation and awareness-raising. Germany is innovative and internationally competitive. However, there is a need for action in expanding the broadband infrastructure on the basis of fibre optic cables and technologies that provide consistently high transfer rates. If it also proves possible to establish uniform, secure and open standards for data transfer the Mittelstand will have every chance of overcoming the challenges accompanying Industry 4.0



Source: (josay.org)

Figure 1. The Industrial Revolution 4.0

The forces of digital technology has made dislocations unprecedented, fundamentally changing business. Industry has experienced 4 big waves of revolution. The Industrial Revolution 1.0 occurred as a result of the invention of mechanization, with the driving force in the form of water or steam. The Industrial Revolution 2.0 was characterized by the presence of electricity which was able to create mass production with the concept of component assembly. The Industrial Revolution 3.0 arose because manufacturing production was easily controlled automatically through computers, making production more efficient. The Industrial Revolution 4.0 was characterized by a cyber-physical system made possible by the synergy of three forces: Internet of Things (IoT), Cloud Computing, dan Cognitive Computing. Industry 4.0 also known as smart manufacturing, because the entire chain of production automation processes is controlled through Artificial Intelligence (AI) which is composed of complex algorithms that try mimic human intelligence.

Methods

The aim of this study is to examine the objection of the SME industry 4.0 in adopting the digital technology. In other words, the purpose of this study is to answer the question of why SME did not adopt these technologies which are apparently important for them to manage and expand their business. To achieve this objective, a qualitative method is applied.

Strategy/Solution

Ireland et al. (2003) revealed that SMEs relatively and entrepreneurship effectively identified opportunities but lacked success in developing competitive advantages precisely determining opportunities. Whereas Big Enterprise (BE) and established companies often more effectively establish competitive advantage, but are less able to identify new opportunities. The company's ability to identify and seize opportunities and competitive advantages is very important in this industry 4.0.

The level of dissemination among Big Enterprise is higher and they are more likely to deploy the relevant Industry 4.0 technologies than small and medium-sized enterprises. The leading sectors with regard to Industry 4.0 include manufacturers of rubber and plastics and of machinery and plant engineering. With regard to individual Industry 4.0 processes and technologies, however, it appears that across the board, regardless of company size and branch, little use is made of the evaluation of large data streams to optimise processes or for downstream services. Accordingly, little use is made also of higher level cloud services that are useful for that purpose, in contrast to SMEs elsewhere in Europe. Small and medium-sized companies often lack a comprehensive strategy The integration of the data generated in the value creation process requires the networking of various IT systems both within and beyond the company. In this way functional areas such as procurement, production and sales can exchange their data in real time. It is not easy for small and medium-sized enterprises, due to lack of resources, to assess the technological maturity of the relevant solutions and their business uses. Management lacks a methodical approach to implementation.

Industry 4.0 refers to the fourth industrial revolution and technological evolution from embedded systems to cyber-physical production systems. While many large companies are already attempting to anticipate the potential and risks of digitalisation for their respective business models and have introduced innovation processes, SMEs appear to be making heavy weather of it.

The reasons for this are manifold; they are partly internal, but they also arise – and this should give policymakers pause for thought – from the environment. A great challenge for the future lies in the transfer of Industry 4.0 concepts and technologies to small and medium sized enterprises. Despite the expected strong potential of Industry 4.0 in small and medium sized

firms, fundamental models for its introduction and application are missing. The research project titled 'SME 4.0-Industry 4.0 for SMEs' aims to close and overcome this gap through the creation of an international and interdisciplinary research network working on this topic.

The importance of entrepreneurship in providing these new ideas and innovation capabilities, they started to support entrepreneurs, as being the engine of economic growth and sustainable development (Zaki & Rashid, 2016). The existing condition of the business in Indonesia is based on data from the Ministry of Cooperatives & SMEs and BPS in 2017 as follows:

Tabel 1. The Existing Condition of the Business in Indonesia

ENTERPRISE	OMZET PER YEAR	ASSETS	TOTAL
Big	> Rp 50 billion	> Rp 10 billion	± 5.460 unit (0,01%)
Medium	Rp 2,5 billion -Rp 50 billion	Rp 500 juta-Rp 10 billion	± 58.627 unit (0,09%)
Small	Rp 300 million-Rp 2,5 billion	Rp 50 million-Rp 500 million	± 757.090 unit (1,20%)
Micro	≤ Rp 300 million	≤ Rp 50 million	± 62.106.900 unit (98,70%)

Source: the Ministry of Cooperatives & SMEs, BPS 2017

Movements that took place from Industry 1.0, 2.0 and 3.0 to industry 4.0 brought many business changes. If previously the industrial revolution moved into the line of mechanization, electrification, to automation using electronics and IT, industry 4.0 is now moving towards networking, networking is key factor. Industry 4.0 brings many conveniences, including the development of SMEs. SMEs should look to identify where industry 4.0 can add value to their business, making the technology work for them rather than it being just another expense for a bit more insight.

Core business in industry 4.0 lies on the technology side. To deal with industry 4.0, SMEs are equipped with strengthening R & D in the fields of technology including, Physical Based Tech (Smart Sensors), and Platform Technology (5G, Cloud Computing, CPS, HMI, Energy system), Cyber Based Tech (IoT, Artificial Intelligence, Big Data, and Cyber Security)

In industry 4.0 there is greater connectivity in manufacturing. The industrial revolution that occurred was based on cyber-physical systems that made it easy for the production process to be made without the need for large funds. In the era of industry 4.0 SMEs became the center of new job creation for the economy. In an effort to develop SMEs, to increase Indonesia's global competitiveness.

Economic potential of industry 4.0 include are positive macroeconomic effects expected, more flexible production with falling production costs, and value creation networks and new business models (Schröder, 2019). The SME segment businessmen are facing the challenges of the industrial revolution 4.0 which demands the readiness of the industry players to deal with it. The increasing quality of administrative management and financial transactions in supporting its business, this will directly strengthen the competitiveness of SME through the efficiency and effectiveness of their business and financial processes.

Indonesia’s macroeconomic conditions are supportive of SME and entrepreneurship development and include a young and growing population, a large domestic market, abundant natural resources, a stable political system, a prudent fiscal policy framework and steady economic growth. Indonesia’s employment rate is also lower than the OECD average, but working conditions are, on average, poor. Informal employment is estimated at 70% of total

employment and vulnerable employment (e.g. own account workers and unpaid family workers) at 58% of total employment, higher than in China (45%), the Philippines (37%) and Malaysia (22%). There are also signs of skills deficits in the Indonesian labour market. Twenty-seven percent of the total labour force has only completed primary education and 17% has not attended or has not graduated from primary school. Business incubation activity has not yet reached its full potential in Indonesia. Most incubators are small in scale (with 3-5 tenant enterprises) and do not offer a full range of services in the form of consulting, technical support, mentoring/coaching, and linkages to sources of finance for tenant enterprises. Furthermore, only 10-20% of incubated enterprises are estimated to graduate from the incubator and move on to become sustainable companies. The government has launched the Roadmap for Incubator Development, 2014-2029, to increase the number of incubators and improve their performance. The Roadmap sets the target of reaching 732 incubators by 2029 from 75 in 2014. As part of the Roadmap, operating standards for business incubators and a certification programme for managers of incubators are being developed (www.oecd.org/cfe). As major industrial players, SMEs have to meet ever more complex customer needs. Therefore, they are working on improving operations management: production planning and execution, production control, operational performance measurement and evaluation.

The Indonesian government has placed a strong emphasis on ICT development and ICT adoption at the firm level, notably by ramping up spending on broadband infrastructure and by implementing an E-commerce Roadmap that involves several ministries and government agencies. However, other aspects of the knowledge economy require further attention. R&D expenditure, in particular, accounts for only 0.08% of GDP in Indonesia, compared with an OECD average of 2.5%. In 2018, only 18% of Indonesian SMEs are currently engaged in e-commerce through the use of a website or social media, and only 9% adopt more sophisticated e-commerce strategies. The national government is enacting an E-Commerce Roadmap to boost the use of e-commerce by SMEs. Three main programmes in the E-Commerce Roadmap, all of them operated by the Ministry of Communication and Informatics, are the SME Go Online Programme, the One Million id. Domain Programme, and the 1 000 Digital Start-up Programme. These programmes complement each other: the first two help SMEs to expand their markets by building an online presence, while the third encourages the development of digital start-ups. An important challenge facing these interventions will be not only to meet the ambitious targets they have set, but also to make sure that the outcomes they achieve are sustainable after the phase-out of government support and have a real impact on business growth (www.oecd.org/cfe).

Minister of Industry Airlangga Hartarto revealed 10 national priorities for Indonesia to face the 4.0 Industrial Revolution are 1. Reform Material Flow: Increase production upstream. For example, currently 50% of petrochemicals are still imported; 2. Industrial Zones Redesign: Building a single national scale road map; 3. Sustainability Embrace: Taking opportunities along with global trends, such as electric cars and biofuels; 4. Empower SMEs: Empowering 3.7 million SMEs through technology, such as e-commerce for SMEs and technology in banks; 5. Build Nationwide Digital Infrastructure: Increase network capacity and digital platforms, such as 4G to 5G, 1 Gbps fiber optic speed, data center and cloud; 6. Attract Foreign Investments: Provides attractive offers to large-scale global manufacturing companies, and accelerates technology transfers; 7. Upgrade Human Capital: Redesign the curriculum in accordance with the Industrial Revolution 4.0, and create professionals in saying mobility programs; 8. Establish Innovation System: Increase the capability of the R & D center (research and development), both from the government, the private sector and universities; 9. Incentivize Technology Investment: Introducing abolition or subsidies for technology adoption, and funding support; and 10. Reoptimize Regulations & Policies: Design policies or regulations through collaboration between ministries. (www.cnbcindonesia.com/news).

Benefits can SMEs gain by implementing Industry 4.0 solutions (Aloni, 2019) including 1. All processes are monitored; 2. Manufacturing processes are optimized; 3. Waste is eliminated; 4. Procedures and practices are more easily established; 5. Employees are more involved, empowered and committed.

Strategy SMEs need to build sharing schemes benefits including 1. Providing financing; 2. Marketing funding; 3. Digital Marketing; 4. Research and development; 5. Human capital; 6. Organization; 7. Networking and grouping between SMEs; 8. Incubator & Accelerator Business. Entrepreneurship plays an important role in transformation towards a more sustainable future (Belz, 2013; Hall et al., 2010). Sustainable entrepreneurship aims at balancing the triple bottom line of economic, social and ecological goals (Cohen et al., 2008; Shaltegger and Wagner, 2011). Business ecosystems that are sharing economy require collaboration. Through networking, companies can get more demand. Technology development and business models based on changing cultures, human centers, require humane entrepreneurship in developing business. Not only technological innovation, human centered entrepreneurship is the most important thing because employee is a company asset.

Conclusion

Industry 4.0 (Industrie 4.0) is a synonym for the fourth industrial revolution. The term originated with a future-oriented project that was part of the German government's high-tech strategy. Its influence to other countries applies Industry 4.0 to SMEs. The Indonesian government supports the SMEs to adopt Industry 4.0 by issuing priority 10 strategies.

SMEs are recognized for their flexibility and proximity to customers, and are also recognized for their low investment capacity and short-term strategy. In this sense, some means of realization cannot support the strategy of SMEs. Production tools require too much investment, while collaboration tools and optimization tools seem less expensive. Research should focus on adapting optimization tools to the characteristics of SMEs, mainly exploiting massive data to improve operational performance.

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