THE SERVITIZATION IN INDUSTRY 4.0, FACING CHALLENGES AND TENDENCIES.

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THE SERVITIZATION IN INDUSTRY 4.0, FACING CHALLENGES AND TENDENCIES.

Abstract. Since 1995, productivity growth in the Brazilian manufacturing sector has been slowing down, is partly due to productivity gains and associated falling relative prices of manufacturing in relation to services. Many manufacturing firms are adapting to offer integrated solutions based on the needs of their customers. Within this context, servitization and digital technologies become key factors for firms immersed in the so-called ‘Industry 4.0’. The aim of this work is to analyse the relationship between the servitization and digitalization, as well as its tendencies, challenges and barriers that impede the implementation of digital services in the industrial and commercial sectors, from a theoretical perspective. Digitalization and servitization are treated as related factors of value-creation in the firm, and thus a source of competitive advantage.

Keywords: Servitization, digitalization, industry 4.0.

1. INTRODUCTION

1.1 CONTEXTUALIZATION

Nowadays, we are living in a world surrounded by risks and uncertainties. In a world where changes happen at a frightening frequency. In this world companies need to continually adapt and develop new attitudes and practices to manage all these new risks that are projected in any project.

The servitization is a new reality that companies need to position their business, changing the way they currently operate, finding the right approach to be competitive in the market, in spite of change.

1.2 RESEARCH PROBLEM

In times of economic crisis, the value chain of the manufacturing industry is becoming less attractive in the demand for products that are becoming stagnant, under these circumstances, companies are increasingly becoming aware of the gains associated with offering services along with their products (PISTONI E SONGINI, 2018).

In developed economies, intense pressure on manufacturing industries is forcing many manufacturers to innovate to differentiate their products by offering additional services.

The traditional boundaries between manufacturing companies and service providers are narrowing and spreading all over the world. To survive, many manufacturing companies have to deploy beyond manufacturing and offer services and solutions delivered to the customer with their products, or at least in association with them. This strategy is called "servitization", encompassing new commercial models based on the product service system (PSS) (PISTONI AND SONGINI, 2018).
1.3 HYPOTHESES.

In this work, the premise will be tested that: Services demand a greater constancy of revenue and high profit margin, since for the consumer the purchase of product-service (servitization) represents a smaller investment than the acquisition of goods itself (PISTONI E SONGINI, 2018). According to Lightfoot et.al (2015), the premise of value creation from the perspective of a business model for the company seems to be beneficial for the investment in the servitization strategy, and the same is true from the customer perspective. And Pistoni and Songini (2018) also raises this discussion, because the service is considered by some consumers as a prop or extra cost for the product, but it is still better than buying the product and then the service separately.

Thus, to satisfy the consumer's perspective Pistoni and Songini (2008) describes that the strategy should be to devise a "package" with the value of the product and service as one, thus removing the possibility of separating the items, or by having the items sold separately have a high unit cost so that the sum exceeds the value of the "package".

Furthermore, the emergence of the latest digital technologies in industry's 4.0, has allowed companies to offer intelligent and connected products and services (PARIDA et al., 2014; LENKA et al., 2017 apud BASAEZ, MARCO et al., 2017).

This recent trend of the industry, focused on the exploration of the use of digital technologies in the manufacture of products, which has contributed to the feasibility of services that add value and that contribute to meet the expectations of the increasingly demanding customer.

1.4 OBJECTIVES

The aim of this work is to analyse the relationship between the servitization and digitalization, as well as its tendencies, challenges and barriers that impede the implementation of digital services in the industrial and commercial sectors, from a theoretical perspective. Digitalization and servitization are treated as related factors of value-creation in the firm, and thus a source of competitive advantage.

1.5 RELEVANCE

This paper reviews literature related to the case study of Servitization as a new business model, exploring the digital technology that Industry 4.0 offers for the digitization of mutually integrated products and services.

We will also cross-analyze in the literature and case studies the barriers and factors that drive the digitization of the servitization, presenting by means of theoretical concepts the opportunities of this transformation in the business model that the servitization represents, as well as to conceptualize the impact of the industry.
1.6 DELIMITATIONS

This research was delimited as a conceptual approach in the theme of the insertion of the
digitization in the context of the servitization and its theoretical concepts to build a new framework
with the digitalization and industry 4.0 as a tendency in the servitization, And thus as a result will be
demonstrated the eight barriers that make difficult the process of digital servicing, providing
insights into the drivers and barriers regarding manufacturers' propensity to use digitized service
offerings.

1.7 WORK STRUCTURE

In chapter 1 is presented some generalized characteristics regarding servitization. In Chapter 2
we show the information base, obtained mainly from articles studied on the subject. Chapter 3
shows the methodology and the fundamentals that were used to formulate the results and
conclusions. Chapter 4 explores studies on facilitators and barriers to servicing, acquired in article
studies and data research. In Chapter 5 the conclusive results of the research are discussed.

2. THEORETICAL REFERENCE

2.1 THE SERVITIZATION AS BUSINESS MODEL.

Product Service Service (PSS) or IPS² (Industrial Product-Service Systems) also known as
servitization, is a business model that emerged in the 1990s as a solution to add more value to the
product, allied to the customer's approach and loyalty. The PSS or Servitização combines tangible
products with intangible services, aiming at economic sustainability and reducing environmental
impact, while increasing competitiveness (BRAD and MURAR, 2015).

Neely (2007), Baines et.al (2007) and Coreynen (2016) explain that servitization is the
innovation of organizational and process capabilities to improve value-added through a systematic
change of the supply in just products for sale of product-services. A system like product-service, is
an integrated product offering services that offers value in use. An Organization that integrates in its
business model the servitization, builds and delivers a complete integrated solution of products and
services that offers its customers comfort and tranquility in the acquisition of a particular asset.

A product-service system is an integrated product with services that offers value in use, in
this way, an organization that has adopted servitization as its business model, designs, builds and
delivers an integrated offer of products and services that offers value throughout the product life
cycle.

Slack (2010) says that this concept of servitization or product-service is leading the strategy
of companies that want to improve competitiveness and is an area of growing interest.
Thus according to Cusumano et al. (2015) apud Vendrell-Herrero et al. (2017) Companies are gradually adopting the servitization as business models.

And approximately two-thirds of companies in developed countries have already adopted the servitization strategy (Neely, 2008 apud VENDRELL-HERRERO et all 2017).

Through serviceability, companies can differentiate their offer and improve customer engagement (VANDERMERWE & RADA, 1988 apud VENDRELL-HERRERO et al. 2017). However, recent studies have shown that the capture of value, through servitization strategy is complex in companies that produce manufactured and digitized products (BENEDETTI, NEELY, & SWINK, 2015; KOHTAMAKI, PARTANEN, PARIDA, & WINCENT, 2013; SUAREZ, CUSUMANO, KAHL, 2013 apud VENDRELL-HERRERO et al 2017).

However, although this business model is considered complex, servitization has proven to be an essential strategy to take advantage of the opportunities and to differentiate your products, along with the improvement of the interface with the client and to obtain a competitive advantage in face their competitors.

2.2. THE FOURTH INDUSTRIAL REVOLUTION

The world is on the edge of an unprecedented new technological revolution, which will completely change the way we live, work and relate to each other, considering infinite possibilities due to billions of computer connections and mobile devices that connect people everywhere on the planet in real time (SCHWAB, 2016). And according to Hyacinth (2017) the production method in the present century has witnessed enormous changes.

Schwab (2016) describes that the first change in our way of living occurred 10,000 years ago when man began domestication of animals and combined efforts with them for production, transportation, and communication, then the advent of the first industrial revolution from of 1760 activated by the construction of railroads and the invention of the steam engine, the mechanical production was inaugurated, already at the end of century XIX arose the second industrial revolution with the mass production, promoted by the advent of electricity and the assembly line. The third industrial revolution began in the 1960s, also known as the digital revolution, because it was catalyzed by the development of semiconductors, where the development of automated systems with the help of computers began, so the sector is growing in all its faces, acquiring each technologies to improve the production process.

Schwab (2016) says that many professionals and academics still consider all this transformation as part of the third industrial revolution, but this transformation is distinct due to three factors cited by him:

1 - Speed of change never seen in human history;
2 - The extent and depth of the changes.
3 - Economic, social and cultural impact that is changing the way we live.

In according to Ustundag et.al (2018) and Schwab (2016), the fourth industrial revolution or industry 4.0 is done by combining numerous physical and digital technologies such as artificial intelligence, cloud systems, adaptive robotics, augmented reality, Internet of things. The main aim of industrial transformation is to increase the efficiency and productivity of resources to increase the competitive power of enterprises. The era of transformation we are now experiencing differs from others, because not only provides change in companies but also reveals the concepts of intelligent and connected processes and service-oriented business models.

And more Shamim et.al (2017) and Ustundag et.al (2018) describe that Industry 4.0 and other methodologies and management philosophies are not mutually exclusive, they can be integrated with each other for Product Production Management success and services.

The fourth industrial revolution isn't only oriented towards industry, according to Schwab (2016), its scope is much broader. As with advances in areas of gene sequencing, nanotechnology, renewable energy, quantum computing, Artificial Intelligence (AI), Internet of Things (IoT), Standalone Vehicles, 3D Printers, New Intelligent Materials and Alloys, Energy Storage, Smart Sustainability. But especially with the fusion of these technologies and their interaction between physical, digital and biological domains that make it fundamentally different from previous revolutions (SCHWAB 2016).

This is the proposal of Industry 4.0, through the advanced application of information and communication systems in production. Thus building intelligent factories that allow mass customization (SANDERS et.al, 2016, SCHWAB 2016).

Harari (2016) states that currently the knowledge is the main source of humanity wealth and power, in opposition in the past when humanity had as main source of wealth the material resources.

These technologies, developed and joined by Industria 4.0 according to Schwab (2016), will create new business models, remodel the economy, culture in every human context, remodel the production system and the logistics system and our transport system, aiming to eliminate losses and waste.

2.3. MEGA DIGITAL TRENDS.

According to Schwab (2016), all innovations were only possible thanks to this digital revolution. Just as intelligent robots would not exist without the development of IA, which are dependent on computing power.

Schwab (2016) cites 4 Megas digital trends:
1 – IoT internet of things: connects products, services, places, etc. with people, which are made possible by connected technologies and various platforms;

2 - Radio Frequency Traceability (RFID) that allows tracking products through the supply chain;

3 - Blockchain, which is a secure computer network protocol that checks a transaction before it can be registered and approved. The block is shared, programmable, cryptographically secure and therefore reliable. No user controls and can be inspected by everyone.

4 - Business platforms focused on services (digital servitization), offer new services ranging from laundry to shopping, parking tasks, carpooling, combining supply and demand with low cost, generate opportunities as people who never considered themselves suppliers, ie a seat in your car, a spare room in your home, a commercial link between a dealer and manufacturer.

Schwab (2016) comments on other platforms such as "Uber, the biggest taxi company, does not own vehicles." Facebook, the largest owner of popular media, does not create any content, Alibaba, the most valuable reseller, has no inventory and And Airbnb, the largest accommodation, does not have properties.

2.4. IMPACT OF INDUSTRY 4.0 ON BUSINESS MODEL.

The technologies developed in the fourth industrial revolution are having a major impact on how companies are conducted and organized.

Many companies have invested in introduction of new technologies that create new trends with the focus of meeting the expectations of their customers, such as the offer of services connected to products.

Schwab (2016) cites the widespread adoption of 3D printing to make a Distributed and Decentralized Manufacturing. Capturing unique customer information and asset performance data that will amplify other technology trends.

The disruption will also lead to the formation of agile and innovative competitors who, by accessing digital platforms, will be able to develop marketing, sales and distribution faster, improving quality and price.

Schwab (2016) cites four major impacts of the fourth industrial revolution in business:

2.4.1. Customers expectation,

According to Schwab (2016), the consumers are increasingly demanding in terms of quality, speed of delivery, and customer service. The Apple, for example, is concerned not only with product
quality and performance, but also with packaging, branding, shopping, and customer service.

2.4.2. Enhancement of products by data.

New technologies are changing the way organizations manage their resources, products and services are enhanced with digital capabilities for increase their intrinsic value.

Schwab (2016) describes about data capture by sensors installed on equipment are managed and monitored by software that contains analytical algorithms to detect failures, calculate performance and report maintenance needs, and too optimize performance at the maximum limit of the equipment in aircraft, for example, control centers know beforehand if an engine is failing. They can therefore instruct the pilot on what to do and mobilize the maintenance team upfront in the flight's destination.

Schwab (2016) also comments that the ability to predict the performance of a product, allows the creation of new business models as servitization. The performance can be measured and monitored over time and provide operational information serving as the basis for business strategy.

2.4.3. New partnerships.

Schwab (2016) describes in your book, how new partnerships are being formed as companies learn the importance of new forms of collaboration. Such collaborations, however, require significant investments from both parties to develop firm strategies, to seek appropriate partners, to establish communication channels, to align processes, and to respond flexibly to changing conditions.

2.4.4. New structural models.

According to Schwab (2016) and Sanders (2016) emerging companies will need to change their structural models such as: focusing on customer satisfaction, investing in assistive technologies, and making more efficient use of energy and material flows, preserving resources, reducing costs and positive impact on the environment.

In almost all industries, digital technologies have created new and disruptive ways of combining products and services.

2.5. SERVITIZATION IN INDUSTRY 4.0.

Although the development of servitization is commonly traced back to the early 1990s; It originated in the United States and quickly achieved success in Western Europe (PISTONI AND SONGINI, 2018).

Lightfoot et.al (2015) says today the companies are in position to "offer packages"
consisting of combinations of goods, services, support, self-service and knowledge with customer-focused.

According to Hojnik (2016), servitization is one of the economic megatrends of modern society, a process that creates value by adding services to products, ranging from renting and holding capital goods to producing objects and rapid prototyping, such as the use of printers 3D,

In view this megatrend of the business model called servitization, companies are starting to implement their products and machines with intelligent digital systems, so they can operate independently and communicate with other machines in production.

This development is referred as "Industry 4.0" which has your main focus in Germany, and includes the digitization of traditional industries (SPATH et al., 2013, BAUER et al., 2014, apud LERCH and GOTSCH, 2015).

As consequence of this trend, a growing number of companies are beginning to use digital systems for their service offerings (MUNSTER and MEIREN, 2011 apud LERCH and GOTSCH, 2015).

2.6. SERVITIZATION DIGITAL.

A wide range of researchers has examined the role of digital technologies, especially those related to information and communication technologies, in manufacturing companies, examining how the new digital technologies drive and act as facilitator of servitization (VENDRELL-HERRERO & WILSON, 2016 PISTONI AND SONGINI, 2018).

"Digital servicing" consists mainly of incorporating digital services into a physical product (HOLMSTROM & PATANEN, 2014 apud PISTONI AND SONGINI, 2018 and COREYNEN 2016) and aims to develop especially the capture and processing of data and information, allowing manufacturing companies to develop new business models by exploiting the potential of their products. (VENDRELL-HERRERO & WILSON, 2016 apud PISTONI AND SONGINI, 2018).

The digitalization facilitates the development of economic operations and it's a facilitator of service quality through better allocation of resources and more accurate information sharing within and outside the boundaries of the enterprise (KINDSTROM & KOWALKOWSKI, 2014, PISTONI & SONGINI, 2018 and COREYNEN 2016).

Some examples of digital servitization in industry 4.0 can be seen in the business model of the Volvo company which, while essentially a car manufacturer, is also involved in the broad spectrum of activities associated with the provision of services, from insurance to technical assistance, and has even developed a system that can, through a smartphone, alert a mobile fuel supplier to come and complete the tank when the car is parked (VANDERMERWÉ and RADA, 2015 apud HOJNIK, 2016).
The Amazon doesn't sell books, but offers a variety of related services, such as cloud infrastructure and network; And IBM leveraged your growth in software and consulting, from a computer hardware manufacturer to a computer services company (GERSTNER (Harper Business), 2002 apud HOJNIK, 2016); All these companies have converted product sales into integrated product and service solutions (HOJNIK, 2016).

In summary Hojnik (2016) claim that the service and information revolution are two sides of the same coin and is becoming a primary component for servitization.

2.7. THE ROLE OF THE INTERNET OF THINGS (IoT) IN THE SERVITIZATION.

The Internet of Things (IoT) is seen as one of the most important facilitators of servitization, because through it, the goods servicing companies remotely monitor the condition of the equipment and seeks indicators of imminent failure through vibration, temperature and pressure sensors. This reduces technical support visits, reducing costs and producing fewer interruptions and greater customer satisfaction. Remote diagnostics, besides the possibility of repairing industrial machines, can also be used for human health, such as remote control of pacemakers (HOJNIK, 2016).

The emergence of fast and powerful ICT, such as the Internet, plays a leading role in improving existing business models (HOJNIK, 2016 and HOSONO et.al, 2016).

ICT service providers, have provided the integration of systems and services to their customers. Integrators of these systems have played a key role in delivering the product-service as they implement software and cloud integration in the Internet of Things (IoT) technology and deliver on-premise ICT systems infrastructures along with hardware products and then provide support (HOSONO et.al, 2016 and ARDOLINO et.al, 2015).

Consequently according to Hojnik (2016), smart products present an advanced form of servitization, which merges tangible and intangible (Internet-based) products, ranging from maintenance and repair services, human health condition monitoring, energy efficiency services, taxi call service, parking assistance or even autonomous driving.

Dinges (2016) describes the combination of hardware and software technology to make predictive analyzes to predict the future state or failures of the product, equipment or machinery.

Lerch and Gotsch (2015) argue that greater service orientation with greater complexity leads to a greater need for digital solutions. On the other hand, the use of ICT systems opens new potential branches to provide innovative services.
3. METHODOLOGY

Due to the wide possibilities offered by digitalisation, these questions arise: 1 - To what extent digital systems in industry 4.0 influence the transformation of the business model of companies to become a provider of solutions that offers the customer a package of its product-service (servitization). 2 - And which directions and barriers are hidden behind this process?

To answer these questions, will be done a review of the literature with focusing on recent articles and books dealing with the digitization and transformation of companies. After analyzing the most relevant articles, we have to derive the facilitators and barriers described in the different studies. And so, discuss the findings by reflecting on existing theoretical concepts, implementing implications for strategic management, and giving an overview of the current and future scenarios.

4. DEVELOPMENT

The development of this article was developed using descriptive research in articles and books of different authors.

And according to Pinillos (2017, p.82) we can say: “...servitization as a scientific discipline using qualitative techniques and to less extend quantitative techniques.”

4.1. THE STAGES FOR THE DEVELOPMENT OF DIGITAL SERVITIZATION.

According to Apa (2014) there are few evidence describing the evolution of servitization in the manufacturing field.

For Carvalho et.al (2013) the transition between simple products companies, to products + services (servitization) is influenced by issues related to the proximity of its customers, service providers and government, focusing on the company's market strategy, facilitating the control and management of yours businesses, but also aiming at sustainability with the association of the offer a unique solution system that reduces the total amount of goods produced with the introduction of new concepts to use of the product (rent and leasing) that influence consumption patterns.

Basically, the standard can be summarized as follows: company, offered goods or services, then switched to a different type of offerings, linked their products to closely related services, and eventually became "package" companies consisting of "Focused customers". combinations of goods, services, support, self-service and knowledge "(BAINES, LIGHTFOOT, BENEDETTINI, & KAY, 2009 apud APA, 2014).

However, in a more in-depth study with an analysis of three case studies and literature data, Lerch and Gotsch (2015) developed four generic stages that lead to digital servicing, analyzing the dependencies of the individual characteristics and activities of the manufacturers according to...
Lerch and Gotsch (2015) comments on the transformation stages of the manufacturers under the influence of the servitization and digitization presented in the graph:

I. Manufacturer: The first stage is characterized by manufacturers providing mandatory product-related services such as installation or maintenance and repair and use of standard ICT solutions for their services such as digital text files, e-mail, video calls, etc. This stage sees ICT Solutions being used for day-to-day work, with almost no significant impact on the way service offerings are performed in competition (LERCH AND GOTSCH, 2015, p.77).

II. IT-based services: Stage II companies use ICT solutions to enhance their existing service offerings; This is also known as the concept of tele-services. As a result, companies can deliver services faster, with fewer resource inputs and / or higher quality (LERCH and GOTSCH, 2015, p.77).

III. Pure digital services: Stage III manufacturers offer services that are enabled by ICT systems. Examples of such services include software-based simulations, virtual or augmented reality applications, or digital technical analysis. These services extend manufacturers' service offerings and significantly improve product or service performance (LERCH and GOTSCH, 2015, p.77).

IV. Scalable Product Service Systems: Manufacturers at this stage not only provide complex product service systems to their customers, but also use ICT solutions as a new component in the product services package. The goal of this digital infrastructure is to create intelligent, independent operating systems capable of delivering the highest availability, optimal operating conditions and greatly reduced resource inflows at the same time (LERCH and GOTSCH, 2015, p.77).
4.2. THE INTERNET OF THINGS IoT AS MAIN DRIVER.

The Internet of Things (IoT) interconnects physical objects to the Internet. With this technology at the service of servicing, companies are able to differentiate their offer and improve engagement with the customer.

IoT is going through a fast-growing phase. McKinsey (2016) apud Gauthier (2017) estimates that the total size of the IoT market is expected to grow by $ 3.7 billion by 2020 and $ 6.2 trillion by 2025. Gartner (2015) apud Gauthier (2017) predicts 20,8 billion connections will be in use worldwide by 2020. Most businesses will be impacted.

Business competitiveness is increasingly dependent on your ability to add services to your products.

The process of servitization continues to be a major challenge for a number of reasons, such as the creation of a new management of entrepreneurship (GAUTHIER et al., 2017 apud GAUTHIER, 2017), creating disruptions in the supply chain (VENDRELL-HERRERO et al., 2017 apud GAUTHIER, 2017) or increasing complexity of value-generating mechanisms (BENEDETTINI, et al., 2015, KOHTAMAKI, et al., 2013, SUAREZ et al., 2013 apud GAUTHIER, 2017).

4.3. THE BARRIERS FOR THE IMPLEMENTATION OF SERVITIZATION DIGITAL.

Digital servitization, although it is an innovation of the servitization that is already being implemented by the companies, still struggles against difficulties for their subsistence.

Lerch and Gotsch (2015), identified and classified eight key drivers of digitalisation in service:

1. **Complexity of services offered**
   The complexity of the services offered by the companies influences the level of digitalization, that is, the more advanced and ambitious the services, the more it needs the support of intelligent ICT solutions to offer its customers (LERCH and GOTSCH, 2014; GEBAUER et al. 2011 by LERCH and GOTSCH, 2015).

2. **Technical infrastructure**
   Technical infrastructure as real-time communication networks are essential for the digitization of services, and these networks must have high rates of data transfer and must be able to process large amounts of information. Without a stable and reliable network, digital services can not be offered economically. (BAUER et al., 2014; WESTKAMPER et al., 2013 apud LERCH and GOTSCH, 2015).
3. **Integration of value chain partners**

Integration of value chain partners: in manufacturing enterprises, it is essential to work in cooperation with technology partners or suppliers in order to continuously improve products and at the same time, it is important to increasingly deepen the relationship with customers, because the demand for personalized products and services is increasing. The growing need to integrate vendors into production processes and customers must be managed more efficiently through the use of digital services (BUSCHAK 2013; GEBAUER et al., 2011, LERCH and GOTSCH, 2015).

4. **Sharing of exports**

Sharing of exports is another driver of servitization. Especially, companies with high export sales benefit from new digital opportunities because digital and remote control services open up the chance to offer activities that are independent of consumer location, whether with maintenance or remote repair services. High-quality products that are also equipped with spatially independent services are encouraging foreign customers (HOLTBRUGGE et al., 2007 apud LERCH and GOTSCH, 2015).

5. **Scanning of the core product**

Digitization of the core product: the services offered by the companies should be considered in terms of their connection to the main product. Therefore, it is not surprising that the degree of digitalization of the main product influences the degree of scanning of the tracking services. In order to integrate the services in this network and increase the added value, the services must be digitized in the same way as the physical components (HOFFMANN 2014; BAUER et al., 2014 apud LERCH and GOTSCH, 2015).

6. **Main Product Complexity**

Complexity of the main product should be considered ie the more complex the product, the more useful the services, especially for the customer. Therefore, there seems to be a connection between the complexity of the product and the supply of services that accompany the products. Customers who purchase a technically complex product with digital components need consultancy and training services, preferably must be provided digitally (DACHS et al., 2013, RAINFURTH 2003, WASSMUS 2014, LERCH and GOTSCH, 2015).
7. **Size of the lot**

The size of the batch also influences the digitization of the service, due to the fact that companies that offer one-piece production only or products with a greater degree of individualization end up requiring a greater volume of personalized services as well as special complex machines that are developed especially for a single customer, require a wide variety of digital follow-up services (BORGMEIER 2002, RAINFURTH 2003, SEEGY 2009 apud LERCH and GOTSCH, 2015).

8. **Size of company**

The size of the company affects the digitalization of the service: in fact, large companies have more resources and skills for the application of digital components. Many micro enterprises do not have their own IT services division and are not able to provide individual digital solutions (REICHWALD et al., 2009; RAINFURTH 2003 LERCH and GOTSCH, 2015).

However, one of the major barriers to the digitization of service delivery addressed by Lerch and Gotsch (2015) is the lack of skilled employees in manufacturing companies. Employees providing the services need a continuously growing technical qualification profile with engineering, mechatronics and IT knowledge. Digitalization increases significantly complexity, abstraction, and problem resolution levels. Training and other professional development courses should be offered to overcome this barrier by empowering employees to provide quality digital products and services.

5. **CONCLUSION**

This paper explored the business model of servitization under the aspect of technological evolution and industry 4.0 with its implications and challenges of competitiveness and customer-consumer perspective, analyzed also the recent discoveries about the facilitators and the barriers to the digitization in relation to the offers of services together with the propensity of the manufacturers in the business model of offers of digitized services and considering also the servitization in commercial scope, highlighting the close connection between service and innovation of the business model. The fourth industrial revolution can, on the one hand, act as a driving force for servitization, helping to pave the way for more innovative solutions, while at the same time exposing the negative implications of service provision for society and the economy. However, this exponential advance of technology in global industry 4.0 can overcome barriers to new business models, increase competitiveness, improve quality and open up new opportunities for Brazilian industry, enabling its growth.
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