



Impact of Digitalization and Sustainable technologies in Consumer's Perspective

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Abstract

Digitisation and the advancement of the Internet have changed perspectives on how business is done for both consumers and retailers. Nowadays, consumers can choose to shop while sitting on the train, in the dentist's waiting room or from the lunchroom at their workplace. Delivery options cater to consumers by becoming increasingly flexible and fast, allowing the consumer to choose how and when goods are delivered by offering convenient deliveries directly to the door or a specific postal agent. Therefore, it is critical to cultivate a business environment where companies in the digital market integrate sustainable business models. To further understand this area, we conducted a systematic literature study to describe the current knowledge about the challenges and solutions facing sustainable e-commerce and its business models. Based on 32 peer-reviewed articles published within the last three years, we categorised them into five focal areas of sustainability in e-commerce: (1) production, (2) logistics, (3) waste & recycling, (4) business & resellers and (5) the consumer's perspective. The results show that businesses and resellers focus on sustainability, implying investments in new technology, changes in behaviour, and innovative business models. One result from the consumer category demonstrates the importance of online information related to sustainability since it affects the customers' behaviour. Individuals and consumers are influenced by a variety of aspects, specificities, and qualities, including their own personality traits, shopping habits, purchasing patterns, and the brands. Suggestions for future research are to investigate the effects of e-commerce when increasing online product information and focusing on information as an essential aspect of increasing sustainability.

Keywords: E-commerce, sustainability, digitalization, challenges, business model, Consumer.

1. Introduction

Sustainable consumption is a vital component of sustainable development (Bocken and Allwood, 2012). Consumers are increasingly aware of their environmental and social footprints as well as the role of their consumption in environmental degradation (Jaca et al., 2018). More and more consumers intend to change their consumption practices and choose sustainable products and services (Young et al., 2010). Businesses are also expected to devise strategies that facilitate sustainable consumption (Bocken and Allwood, 2012).

In the transition to more sustainable consumption patterns, the communication of product-related sustainability information from companies to their customers can also stimulate sustainable consumption (Vega-Zamora et al., 2019). Information is an important factor that

influences consumers' willingness to adopt sustainable behaviours (White et al., 2019). Inefficient communication of sustainability-related product information to consumers can be a major barrier to sustainable consumption (Shao et al., 2016). Various marketing innovations that can lead to better communication of sustainability information to consumers are therefore needed (Shao et al., 2016). The communication gap related to the sustainability characteristics of products and services often occurs at the point of purchase, where such information may be lacking (Shao and Ünal, 2019). In this context, existing research suggests leveraging technology to provide consumers with sustainability-related product information (e.g. Kim and Woo, 2016). However, there are scarce insights into the effectiveness of such technological marketing innovations and the factors that influence their utilisation. This paper aims to contribute to this gap in the literature. Various technologies can serve as fruitful tools for the communication of products' sustainability characteristics (Atkinson, 2013). For instance, mobile devices empower consumers by giving them greater access to useful sustainability-related product information on demand and in the retail environment (Atkinson, 2013). A mobile technology that is becoming increasingly prevalent and useful for providing instant access to sustainability information is QR codes. A Quick Response (QR) Code is a two-dimensional barcode that can be read by digital devices, such as smartphones, to access information about the object to which it is attached.

Studies on sustainable e-commerce and its business models are gaining traction (Ingaldi & Ulewicz, 2019; Jaller & Pahwa, 2020; Oláh et al., 2019), and it continues as a highly topical subject due to the continued increased growth of the digital market. Studies have continued during the ongoing COVID 19 pandemic as e-commerce has been given a significant role (Tran, 2021). Still, there are several challenges related to e-commerce and sustainability, besides the aforementioned quicker delivery times. Other related challenges are the possibilities to return without costs (Bertram & Chi, 2018) and the increased use of packaging material (Yen & Wong, 2019). We argue for a literature study summarizing current knowledge and emphasize the result of this literature study as useful to increase sustainable e-commerce. There are few, if any, literature studies, synthesizing the current knowledge on e-commerce and sustainability and related challenges with a digital perspective on the challenges and solutions. Therefore, the aim of this literature study is to identify challenges and solutions with sustainability in e-commerce.

Focusing on a business model perspective, we clarify the research question as: How can challenges and solutions in sustainable e-commerce be described, using a business model perspective?

2. Methods

This literature review is done in two ways, primarily as a systematic literature review, using specified steps (Creswell, 2014; Machi & McEvoy, 2016). We used an exploratory strategy to fill specific gaps in previous findings. In conducting the systematic literature study, we found inspiration in The Literature Review Model by Machi and McEvoy (2016). We used their descriptions of the steps of literature search and organization.

The literature searches

We describe our database selection and the search string. We primarily used the Scopus database for the literature search, based on its widespread content and because it solely contains peer-reviewed material (Scopus, 2021). When articles appeared in a search but were

unavailable through Scopus, we used other databases, such as Google Scholar, to gain access to the documents. We chose the literature search keywords to be sustainable, sustainability, e-commerce, and business model.

Based on these keywords, the search string was constructed to be: (sustainable OR sustainability) AND e-commerce OR {business model}. This search string was then used in two searches with different filters. The first search contained a delimitation to the document type articles and conference papers and to the subject area Computer Science to find relevant documents specifying digital challenges or solutions to create sustainable e-commerce. To find newly produced knowledge, we limited the years for publishing the articles to 2018 to 2021. This resulted in 201 search results. The literature study aims to investigate sustainable e-commerce and its business models, which means relevant documents are also found in other subject areas such as Environmental Science.

Organization

In this step, we used three strategies to collect documents and organize them. First, we briefly scanned the title and abstract of each document to see if it had a focus on sustainability and e-commerce and by this determine its potential to include in the study. We describe the process in more detail below. The second strategy was Skimming to examine the documents more thoroughly and the third was Mapping to categorize documents (Machi & McEvoy, 2016). We describe these strategies next.

Selection and Scanning

The first search resulted in 201 search results. We scanned the title and abstract of each document, resulting in a selection of 39 documents to be saved in the management program Zotero for a more thorough review. To proceed to the more thorough examination, each abstract needed to contain information about sustainable e-commerce and business models.

Due to the relatively large number of hits, document headings were first checked for keywords such as sustainable, sustainability, electronic commerce, e-commerce or business model, or if there were indications that the documents dealt with the studied subject.

3. Results

This literature study on challenges with sustainable e-commerce and its business models resulted in five identified central areas: production, logistics, recycling and waste, business and resellers, and consumers. The first area production and its process addresses using digital technology to reduce energy consumption and improve control of data. Research in the area of logistics shows that the last delivery route and returns decrease sustainability for e-commerce. The third area, recycling and waste, attends to waste management and packaging. The area business and resellers shows that trust and risk-based transactions add to sustainable business and resellers.

Production

As digitalisation moves forward, production becomes intelligent i.e., using analytics and machine learning to optimize outcomes, and there is a strong demand to make the production process sustainable. Due to increased concern about resource shortages and environmental degradation worldwide, new rules and initiatives have been taken to introduce green methods in the industry (Yacob, Wong, & Khor, 2019). The introduction of green technology in production means moving to new or improved processes, technologies or systems to reduce harmful effects on the environment from activities and human activity (Yacob et al., 2019).

Companies that are considered the cause of environmental problems have had to review their production processes and supply chains due to pressure from the government and society (Çankaya & Sezen, 2019). Green methods include environmentally friendly design, raw materials, packaging, distribution and as well as reuse. With these methods during the manufacturing process, there is minor environmental damage through recycling, environmental protection, management and reduction of waste and control of pollutants (Yacob et al., 2019).

Thanks to the advent of intelligent, electric and environmentally friendly transport vehicles and connections, and improvements for optimized technology, the possibility of reducing the environmental effects from logistics facilities increases through technological innovation that is growing faster than ever (Ghadimi et al., 2020). Digitization has led the way to Industry 4.0, which has aroused great interest and is being studied more and more (Nascimento et al., 2019). There is a strong demand to make the production process as sustainable as possible (Birkie, 2018). Industry 4.0 is supported by the development of information and communication technologies and data storage. Integrating advanced technologies such as the Internet of Things (IoT), industrial automation, and cloud services can enable, for example, operational efficiency, improved control of data, and reduction of energy consumption from machines and processes (Nascimento et al., 2019). Cloud services are needed in e-commerce to handle the large amounts of data that arise in, for example, electronic payments on e-commerce platforms (Zhou, Lou, & Jiang, 2019; Zhou, Xu, & Yen, 2019).

The number of returns can be reduced by using modern technology. Last mile delivery The last mile delivery route is a phenomenon that includes the last part of the delivery process. It is a result of growing e-commerce and an increase in more final delivery routes, which are unsustainable in all sustainability aspects (economic, social and ecological), according to Ignat and Chankov (2020).

According to Bertram and Chi (2018), e-commerce contributes to 30% less carbon dioxide emissions than the traditional trade in physical stores and mentions that it depends on distance as shorter trips to stores can be more energy efficient than using e-commerce. Other influencing aspects are fast delivery, customer basket size and supplier consolidation (Jaller & Pahwa, 2020).

Fast deliveries are deliveries within a predetermined time interval on the same day and usually within a few hours. To compete for short delivery times, this may mean that companies need to use alternative delivery methods that have adverse effects on the environment (Bertram & Chi, 2018; Jaller & Pahwa, 2020; Manerba et al., 2018). Jaller and Pahwa (2020) conclude that consolidation is an essential factor when comparing online shopping and physical stores in driving vehicle miles.

Part of the responsibility for a sustainable final delivery route lies with the consumer by trying to buy everything in the same order, according to Jaller and Pahwa (2020), which is also usually consumers' perception of what has the most negligible impact on the environment when ordering several goods (Bertram & Chi, 2018). Fast deliveries are very costly for companies, and companies cannot consistently deliver under these conditions. The consequence of the growing e-commerce is that more trucks than ever drive in and out of cities, contributing to increased congestion, pollution, noise, traffic jams and accidents (Manerba et al., 2018; Seghezzi et al., 2020; Tiwapat et al., 2018; Velazquez & Chankov,

2019). This, in turn, affects the quality of life in cities and human health and well-being (Manerba et al., 2018). There is a demand for delivery prices to be kept low or entirely free for the consumer (Bates et al., 2018; Bertram & Chi, 2018), which puts pressure on e-commerce companies that become dependent on cheaper labour in the form of, for example, private messengers who deliver in their spare time with their vehicle (Bates et al., 2018). These drivers may lack fixed contracts, health insurance and earn less than the minimum wage, which is not sustainable from a social perspective (Ignat & Chankov, 2020). Drivers' driving style (based on the driver's experience, knowledge and relationships) affects delivery efficiency.

According to Bates et al. (2018), is technology essential to support a more efficient delivery of goods. In the MDI area (People-Computer Interaction), new technology can be created that is usefully designed to help drivers plan their routes more efficiently and contribute to sustainability within the final delivery distance. Bates et al. (2018) believe that MDI is a critical success factor in future business models that can contribute to ecological and social sustainability. Tiwapat et al. (2018) state that technology is the key to make the last delivery route more efficient, for example, through applications that enable suppliers to provide consumers with information so that the consumer can see the delivery status and the exact delivery time. Drones that can deliver smaller packages in cities with technology as an aid and built-in GPS is another delivery method discussed for sustainable efficiency within the last-mile delivery area (Ignat & Chankov, 2020; Seghezzi et al., 2020; Tiwapat et al., 2018). There is great interest in applying the phenomenon of 'crowdsourcing' within the last delivery route. 'Crowdsourcing' means that private individuals pick up packages from a warehouse or store in connection with a route that will still take place for, for example, work-related reasons (Seghezzi et al., 2020; Tiwapat et al., 2018). This type of return policy significantly impacts consumer behaviour as consumers become more inclined to shop when companies offer free returns (Velazquez & Chankov, 2019). Velazquez and Chankov (2019) believe that it is essential to analyze the last delivery route when goods return from consumer to supplier and that e-commerce companies should investigate return patterns and, based on that, develop an action plan. It is challenging to avoid returns altogether, but by integrating so-called green technology, the management of returns can be made more efficient (Bertram & Chi, 2018). For example, the software enables consumers to print their return label when needed and return in the original packaging, thus reducing pre-printed return slips. The consumer does not have to buy new packaging to return their goods (Bertram & Chi, 2018). Like Bertram and Chi (2018), Velazquez and Chankov (2019) believe that it is essential to ensure that the packaging is resealable to be reused for return. Another technology used is software that helps the consumer find the right fit and size with measuring tools that measure a product they already own and compare this with a product that they intend to buy online, which then visualizes this for the consumer who will then have easier to choose the right size (Bertram & Chi, 2018; Seewald et al., 2019). A combination of machine learning and styling expertise in human form can also help with returns using lists that contain customer data on body size and complete history of returned goods (Seewald et al., 2019). Reverse logistics is seen as a challenge in e-commerce, which means that companies must accept a high number of returns (Bertram & Chi, 2018). The reverse logistics system consists of a value chain designed to handle the flow of products for resource-efficient reproduction, recycling, or disposal (Wit &

Pylak, 2020). Recycling and waste Recycling is essential as it comes to packaging being used that otherwise could be thrown away. Packaging is considered to account for part of the greenhouse gas emissions in e-commerce, especially when cardboard packaging is used. With the help of advanced technology, the introduction of sustainable packaging can improve the logistics chain and customer satisfaction (Yen & Wong, 2019). When the last delivery distance is long, this often leads to challenges with packaging that need to last all the way, according to Yen and Wong (2019). They studied logistics chains for two of 27th International Sustainable Development Research Society Conference, Mid Sweden University, 13 – 15 July 2021 China's leading e-commerce companies as sustainable packaging is a significant problem. Packaging that is not biodegradable exacerbates plastic waste and carbon dioxide emissions, but by implementing sustainable packaging solutions, pollution problems can be reduced (Yen & Wong, 2019). Using sustainable packaging in e-commerce has a significant impact on the environment, society and the economy. Yen and Wong (2019) provide examples of how packaging can be reduced through, i.e., intelligent packaging technology that increases packaging efficiency. Another solution is the introduction of advanced technology such as drones to increase delivery efficiency (Ignat & Chankov, 2020; Seghezzi et al., 2020; Tiwapat et al., 2018). Yen and Wong (2019) suggest that companies implement strategic alliances as partnerships that can benefit companies that share, for example, costs and knowledge to reduce all unnecessary packaging. Velazquez and Chankov (2019) suggest that companies choose more sustainable, simple and smaller packaging options that are created to be returned (resealable) and create a plan for how they can recycle existing packaging. The suitable packaging material can reduce greenhouse gas emissions and environmental impact (Ingaldi & Ulewicz, 2019). Yen and Wong (2019) believe that information technology can help companies and the entire logistics chain to share data with others. This data sharing can suggest what type of packaging is suitable to use and help facilitate, for example, warehousing. This is needed as e-commerce results in large amounts of packaging being consumed and thrown away. Packaging in e-commerce can account for many greenhouse gas emissions, mainly when cardboard packaging is used (Bertram & Chi, 2018; Velazquez & Chankov, 2019). According to Velazquez and Chankov (2019), this has such a significant impact on all individual packaging, as companies must take separate orders into account and ensure that they are adequately protected upon delivery. There is also a social impact in those e-commerce companies that take measures, which with sustainable work on, for example, packaging, can benefit from being recognized by the public as a company that takes responsibility by protecting the environment (Ingaldi & Ulewicz, 2019; Yen & Wong, 2019). Economically, sustainable packaging can be seen as an expansion opportunity for a recycling business, and it can be an investment area for companies that, in the long run, can benefit from this that becomes more cost-effective (Yen & Wong, 2019). Digital marketplaces in various websites where sales can take place between private individuals who make purchases/sales/exchanges can contribute to reduced waste. This has become a significant problem due to e-commerce when, for example, quantities of clothes are thrown straight into the trash. With this clothing waste comes increased methane emissions and groundwater pollution (Bertram & Chi, 2018). At a company level, companies should introduce management for internal waste with the help of technology and move to sustainable

production with, for example, recycling and reduction of waste and packaging (Liu & Stephens, 2019).

The study of Nosratabadi et al. (2019) showed that four main approaches are central for designing a sustainable business model. The first point is to design a sustainable value proposition, it should be clear what the e-store stands for and why products or services are of value to the customer. The second point is to design sustainable value creation, price and customer service are examples that create value in e-commerce. The third point is to design sustainable value delivery, which in e-commerce could be, as an example, offering customers various and flexible delivery options to make sure the customer is happy. The fourth point is to create sustainable networks for collaboration to be able to create and deliver sustainable values that can meet at the same time the economic, social and environmental benefits. In e-commerce networks can

27th International Sustainable Development Research Society Conference, Mid Sweden University, 13 – 15 July 2021 include collaboration between the e-stores, manufactures and delivery companies. For companies working with a sustainable business model, the 'Triple Line Bottom' (TBL) concept is central. This perspective on sustainability attaches equal importance to all sustainability dimensions, i.e., economic, ecological and social sustainability (Liu & Stephens, 2019; Nero & Raman, 2019). Supporting sustainability in business models is generally of great importance for both research and an application to explain current challenges about the environment and society (Schoormann, Behrens, & Knackstedt, 2018). As the use of advanced technology has increased, both the popularity and success rate of sustainable business models have increased and creating sustainable networks for collaborations and partnerships is, as mentioned above, an essential component in sustainable business models (Nosratabadi et al., 2019). Oláh et al. (2019) point out that essential aspects such as collaborations and partnerships can benefit sustainable e-commerce and the environment and society at large by companies taking advantage of what already exists through cooperation between companies. Through collaboration, all sustainability dimensions can be improved and lead to creating the best possible solutions (Oláh et al., 2019).

Therefore, Liu and Stephens (2019) believe that collaboration and stakeholder involvement are effective components to achieve a sustainable organization. Creating sustainable consumption and production is closely linked to product and service innovation, including innovation in material recycling, energy consumption, process technology related to waste, etc. (Liu & Stephens, 2019). At the company level, sustainable innovation collaborates with services, products, processes and business models, which all can create challenges according to Liu and Stephens (2019). The consumer's perspective Today's online consumers are becoming increasingly aware of sustainability and the importance of including sustainability work in business (Oláh et al., 2019).

They are more informed about the social problems that exist and have an increasing interest in activities that relate to and can help the environment, and expect e-commerce companies to take their responsibility regarding sustainability (Ingaldi & Ulewicz, 2019; Nero & Raman, 2019).

Understanding the intentions of the e-consumer is a fundamental prerequisite for e-commerce companies (Xiao, He, Chi, Jeng, & Tomer, 2019; Zhou, Lou, et al., 2019).

Satisfaction and trust are the factors that have a direct impact on the intention to buy back, and these factors affect consumers' shopping experience, which is expressed through, among other things, online reviews (Zhou, Xu, et al., 2019). For e-consumers, factors such as usability, responsiveness, security, and assurance are of great importance for an e-commerce platform's trust. Trust has a significant influence on consumers' loyalty to the company (Choi & Mai, 2018). There are several challenges related to digitisation when it comes to sustainability. One such is based on the fact that loyal consumers are vital for e-commerce, as they are the key to sustainable success for the organization (Choi & Mai, 2018). Xiao et al. (2019) believe that understanding the ability to anticipate consumers' buying intentions has become essential in achieving sustainable cross-border e-commerce. Big Data is seen as a powerful weapon for providing customized services for the

4. Discussion

This study has identified challenges and solutions with sustainability in e-commerce, in several areas. As the study had a digital focus, most of the identified solutions are technology based.

Current research seems to agree that much can be improved within e-commerce in terms of sustainability aspects and that it is the advanced technology that paves the way for sustainable e-commerce by streamlining and improving the conditions. One ecological aspect on sustainable e-commerce is the last delivery route, where there is room for many sustainability improvements, where researchers discuss, among others, drones and 'crowdsourcing' as potential alternatives to the traditional delivery alternatives (Ignat & Chankov, 2020; Seghezzi et al., 2020; Tiwapat et al., 2018). Another often emphasized solution to make e-commerce more sustainable is information online. Both Tiwapat et al. (2018) and Song et al. (2020) believe that the availability of information online has a significant role for sustainable consumption, thus e-commerce companies have the opportunity to influence consumer behaviour in a more sustainable direction in terms of consumption through information dissemination while this also builds consumer confidence. Working with the challenges within the last delivery route is important to ensure ecological sustainability, along with work towards sustainable consumption with online information and reducing waste from e-commerce, to name a few important aspects. In order for it to be financially sustainable for e-commerce companies, the companies need loyal customers and it is therefore important to create trust.

E-consumers in turn value that companies integrate the ecological and social sustainability aspects into their business model. Therefore, sustainable business models are important for companies that want to establish themselves and maintain their place in the digital market as they increase competitiveness and attract consumers according to researchers (Bertram & Chi, 2018; Ignat & Chankov, 2020; Nero & Raman, 2019).

In other words, it seems that business models that apply sustainability are important for survival on the digital market and an effective tool for achieving success. However, the social sustainability dimension often seems to be overshadowed by the other two dimensions, the economic and the ecological. Many studies focus on the effects that e-commerce has on the environment, where social sustainability is only mentioned in passing. Ignat and Chankov (2020) confirm that the social dimension receives less attention from companies when it comes to establishing sustainability, and instead focuses on economic and ecological

sustainability. Bates et al. (2018) addressed social sustainability in the form of working conditions as a result of tight logistics as e-commerce increases and consumers demand fast and flexible deliveries at very low prices or completely free, which can lead to companies using cheap labour without decent conditions or employment contracts. Oláh et al. (2019) also addresses the social sustainability dimension and emphasizes the importance of having a balance between all sustainability dimensions for e-commerce to be sustainable. It also requires that all identified areas in e-commerce take responsibility for sustainability, from the companies and consumer, to recycling and waste.

5. Conclusions

This study was conducted as a literature study to present current knowledge on e-commerce and sustainability, and related challenges. These challenges, and solutions, were reviewed and classified 27th International Sustainable Development Research Society Conference, Mid Sweden University, 13 – 15 July 2021 into five main areas. These areas are production, logistics, waste and recycling, companies and resellers, and consumers' perspectives. Within these five areas, there are several challenges, such as last-mile delivery in logistics, which could be solved using drones or packaging waste that can be solved via correct data about the size of the products. Further synthesised is that research is prominent in ecological and financial sustainability, diminishing knowledge on social sustainability and e-commerce. The synthesised knowledge can be helpful when trying to achieve sustainable e-commerce, where both researchers and companies can benefit. One suggestion for future research is to investigate how to publish online product information and what effects can be achieved on e-commerce when increasing online product information. Another suggestion for future research is to investigate how organisations publish their strategies related to sustainability and how customers choose when purchasing goods.

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