How Environmentally Friendly is E-Commerce?
An Exploration into Young Shoppers' Perceptions and Preferences

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Abstract

Since its introduction as a purchasing options, e-commerce has become a well-established retail channel across different industries. Environmental sustainability, on its part, is also an important strategic issue companies cannot avoid to deal with and to properly manage. To date, research is mixed about the impact of e-commerce on the environment, in particular with respect to delivery practices; some scholars claim that e-commerce is more sustainable than traditional retail, while others support the opposite. Regardless of who is correct, much of the environmental effect of e-commerce is affected by shoppers' perceptions and behaviors.

Our study aims to explore the impact of shoppers' perceptions of e-commerce and its impact on the environment; in particular, since its involvement with the digital context, the Millennials cohort has been chosen as unit of analysis. In order to do so, data were collected through an online survey.

Though several studies are available in the environmental and logistics literature, to the best of our knowledge, this is one of the first that takes into account the role of the e-shopper in the retail supply chain.

Key-words
online shopping, e-commerce, sustainability, logistics service delivery, environmental impact, Millennials.

1. Introduction

The field of retailing has changed significantly in recent years. The increased use of the online channel and new additional digital channels such as mobile devices and social media have completely innovated retail business models, the execution of the retail mix, and shopper behaviour (Galipoglu et 2018; Hübner et al., 2013).

In summary, the increasing trend of e-commerce phenomenon is mostly related to the research of an answer to consumers' growing request to save time (Colla and Lapoule, 2012).

Consistently, the recent business literature has paid more attention to not only the topics of marketing and service management, but also to other aspects such as operations and logistics management, due to the need to manage a higher complexity with the growth of the number of channels (Verhoef et al. 2015). The improvement of logistics solutions is considered an issue of survival for the retailers as an answer to the changing behaviours of customers and as an essential means to stay ahead of competitors (Fernie and Sparks, 2014).

Moreover, the evolution of digital technologies has led to a customer-centric model, where companies are stimulated to track and anticipate consumers' wants and needs in near-real time (Akter, S., & Wamba, 2016).

Consequently, consumers today are more demanding with regards to the different delivery's options and returns' possibility made available to them (Rao et al., 2011). Assuring a wider and timely alternative allows companies to better respond to market demand, and to increase the level of consumer satisfaction and loyalty (Toufaily et al., 2013).

The engagement in the online channel by store-based retailers is subject to continuous change in because of dynamic retail markets. One of the most followed is Amazon, who has set new service standards which are very difficult for competitors to follow. However, Amazon itself usually has a net loss on shipping due to free shipping offered with the service as Amazon Prime (Bishop, 2017). Still, for many reasons, the model of Amazon is one of the most copied by the competitor's marketplaces. However, the context is recently changed as consumers have started to pay more attention to green logistics practices of companies, particularly of retailer's practices (Barbarossa and De Pelsmacker, 2016).

The current research intends to explore the impact of consumers' perceptions of e-commerce and its impact in their perception on the environment.

The remainder of this paper is organized as follows. First, the literature is introduced to analyse previous studies and to specify the research gaps. Then, the method is described, as well as the results. Finally, the results is developed, and theoretical and managerial implications are discussed.

2. Literature Review

Since the advent of e-commerce, scholars have tried to analyse its effects on the environment.

In the beginning, when e-commerce was still in its infancy and it was not known whether and to what extent it would develop, research focussed on the effects of electronic commerce in general terms, basically providing a comprehensive description. One of the first attempts to estimate environmental effects was made by Matthews et al. (2001), who reported that the delivery impact of books by e-commerce shipment were lower than in-store shopping in local bookstore.

Later, Hesse (2002) claimed that "efficiency benefits of e-commerce are probably too optimistic, whereas its negative effects are underestimated at the same time" (p. 211). Since his analysis is necessarily of a preliminary kind and since no empirical research was performed, his study concludes that it is highly recommended to further investigate the structural change in the entire logistics system.

A few years later, a conceptual model supported by empirical data was proposed (Rotem-Mindali, Salomon, 2007). As determinant factors, such model encompasses among others information gathering, purchase transactions and delivery mode. The authors' preliminary findings suggest that, in order to understand whether information technologies will be able to reduce transport activity, a very relevant aspect lies in consumers' expanded purchase and delivery choice set.

More recent research has narrowed the topic, analyzing in greater detail very specific features within the online retail process. For instance, Allen et al. (2017), consider the last-mile light goods vehicle activity in urban areas. Based on a case study in the city of London, the authors investigate a wide range of characteristics affecting last-mile operators. Results of their analysis is that the optimization of the logistic process requires the involvement of each player involved along the whole chain (customers, e-tailers, parcel carriers, city authorities).

Pålsson et al. (2017), focus essentially on energy consumption, in particular, analysing factors such as packaging, the last mile, unsold products and product returns. After a content analysis on the relevant literature, they conclude that "the net effect of energy consumption is positive for the e-commerce channel in the majority of the cases" (p. 776). Needless to say, the narrow focus of studies of this kind is able to yield good insights, though neglecting several other aspects comprehensively affecting online shopping sustainability.

This brief review highlights that consumers' attitudes and behaviours are largely under researched, though sometimes deemed essential in order to reduce the environmental impact of online purchases. This is probably due to the circumstance that most of the papers are from journals covering either a logistics or an environmental scope.

The current research considers these elements and seeks to explore consumers' perception on e-commerce effects on the environment compared to the more traditional brick and mortar retailer channel.

3. Methodology

Due to the exploratory nature of the research, this study adopted a survey which contains open questions in order to better capture the complex nature of the phenomenon. The survey was administered to a convenience sample of 215 undergraduate business students in a North-Eastern University in Italy. 52.7% of respondents were male and 47.3% female.

This sample was chosen for three main reasons: respondents were part of the so called "millennials cohort" or "generation Y", they have grown up with the Internet (digital natives), and they are very confident in using ICT (Lim & Loh, 2014; Eurostat, 2017a, 2017b).

The survey was distributed during class hours and it consisted of six questions related to the perception respondents had about the environmental issues related to e-commerce. The questions were related to capture respondents' perceptions and preferences regarding:
- whether it is more environmental sustainable e-commerce or traditional store (brick and mortar) (RQ1) and why (RQ2);
- the willingness to wait for a longer time to receive a product with a more ecological delivery (RQ3);

- the adequacy of information e-tailers provide about the environmental impact of the delivery (RQ4);
- the willingness to select the most ecological delivery as an e-tailer's default option (RQ5);
- the willingness to pay more for a faster or for a "greener" delivery (RQ6).

Except for the reasons/explanations of why respondents think e-commerce is greener compared to the traditional channel or vice versa, all the answers had a dichotomous style (yes/no). In addition, two demographics questions were included.

4. Results

Despite few missing answers (n=8), most of the respondents answered to the first question related to the choice of the "greenest" retailing channel between traditional store (brick and mortar) and e-commerce. More than 60% of respondents chose e-commerce as the greenest one compared to brick and mortars (35.8%). Table 1 summarizes the descriptive statistics related to this question.

Table 1. Respondents' perception of the most ecological retailing channel

Retailer' type	Frequency	Percent	Valid Percent
Brick and mortar	77	35,8	37,2
e-commerce	130	60,5	62,8
Total answers	207	96,3	100,0
Missing	8	3,7	
Total sample	215	100,0	

The reasons that led participants to pick one or the other channel as the most ecological one was rationalized by researchers to be the different explanations reducing them into fewer categories based on a content analysis. In order to do so, two independent researchers after reading and interpreting each answer, listed a series of labels that could summarize each motivation/reason. After this step, the labels were compared and discussed together in order to guarantee consistency and coherence across each label.

Figure 1 and 2 summarize the reasons participants perceived e-commerce (Figure 1) or brick and mortar channel (Figure 2) to be greener, compared to each other. Considering the former, 55% of the respondents think that e-commerce allows transport optimization followed by transport reduction (31%).

Participants that choose brick and mortar to be greener justified such choice because they felt it reduces transports. 22% did not provide an answer while 18% stated that e-commerce pollutes more than brick and mortar due to the increase usage of packaging. 17% of respondents reported that brick and mortar allows consumers to optimize transportation.

Figure 1. Reasons to perceive e-commerce as more ecological than brick and mortar retailer
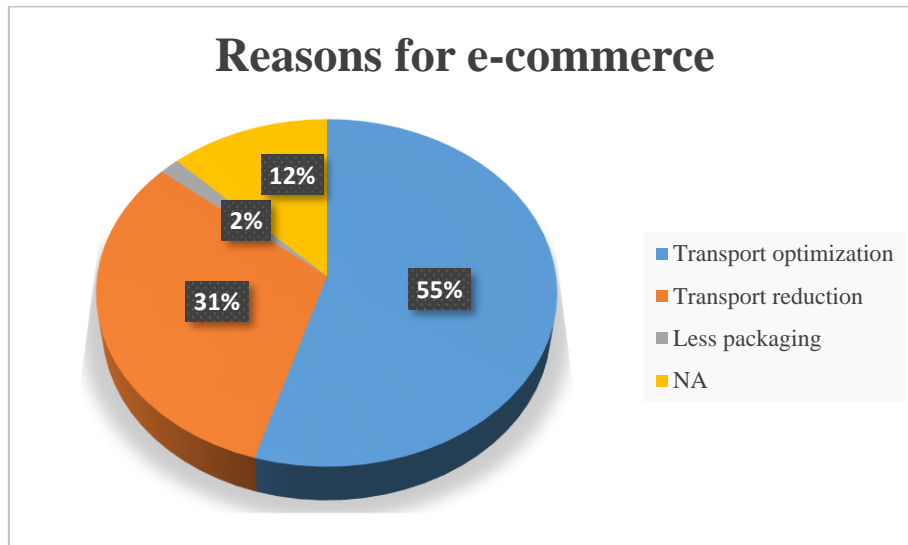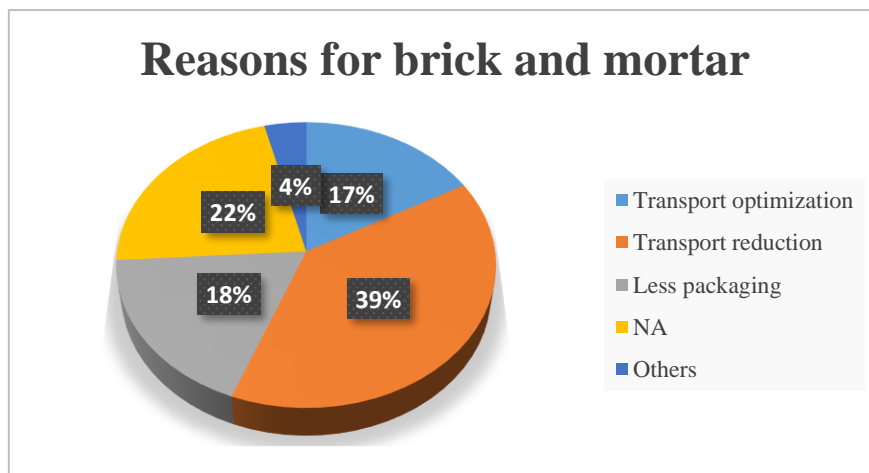

Figure 2. Reasons to perceive brick and mortar retailer as more ecological than e-commerce

Regarding the questions specifically related to the e-commerce green practices, almost two out of three participants (64.4%) declared their willingness to wait for a longer time if this would allow the delivery to be greener compared to a faster one (see Table 2). They also agreed to eventually receive a more ecological delivery as a "default" option of the e-tailer (83.2%).

In addition, when asked if e-tailers provide adequate information about environmental issues of the e-commerce delivery, almost all respondents (93.8%) answered in a negative way.

However, when asking participants to choose to be more willing to pay for a faster or for a greener delivery, most of respondents (74.9%) declared to be willing to pay for a faster delivery rather than a greener one. This means that they are "green" in terms of time but not in terms of money, that is, they are likely to wait more for a greener delivery, while they are not willing to pay more for it. Table 2 summarizes the main results.

Table 2. Respondents' perception of e-commerce delivery practises

Questions related to:	Answer	Frequency	Percent	Total
Q3 the willingness to wait a **longer time** to receive a product with a more ecological delivery	YES	132	64.4	100% N=205
	NO	73	36.6	
Q4 the adequacy of **information** related to environmental impact of e-commerce delivery	YES	13	6.2	100% N=208
	NO	195	93.8	
Q5 the willingness to receive the most ecological delivery as a e-tailer' **default option**	YES	168	83.2	100% N=202
	NO	34	16.8	
Q6 the willingness to pay more for **a faster** or a "**greener**" delivery	FASTER	155	74.9	100% N=207
	GREENER	52	25.1	

5. Discussion and conclusions

This research is still in the exploratory and descriptive stages, so it's not possible to give concrete theoretical contributions and/or relevant managerial implications at this time. Nevertheless, some interesting insights have been gained and some considerations can be drawn.

From a theoretical point of view, it is important to have taken into consideration and to have connected research about e-commerce, logistics, sustainability and consumer behaviour. Usually, such streams of research tend to remain isolated one from the other or, at best, to be considered two by two. An effort to link together such streams is somehow valuable.

Promising as well is the idea to embed consumers' attitudes and behaviours in any analysis of e-commerce environmental sustainability.

The technical complexity of this kind of evaluations notwithstanding, due to the high number of variables involved and the interdependence among them, it seem clear from the data that consumers' decisions in terms of material delivery do count and are crucial indeed in determining the higher or lower sustainability of digital retail.

Further investigation is for sure the main outcome of the research, i.e. the perception of greater sustainability of e-commerce compared with traditional retail that the respondents (young university students) revealed.

A possible explanation for this – deserving deeper investigation – could be a sort of sustainability prejudice in favour of e-commerce, or more in general of anything digital, especially in digital natives.

From the managerial point of view, our research gives executives valuable insights both to deploy environmental and societal friendly actions and to strengthen their competitive position.

Drawing on our results, companies have good perspectives on this respect. Companies able to provide accurate and consistent information and to provide customers with green delivery options could probably benefit from favourable responses from customers and thus take advantage to their direct competitors.

As for the limitations of our research, there are several of them. The first one is that the consumers we investigated were from just one country and one age cohort; the second limitation

is that the consumers we investigated were students from classes where we were teaching during the research.

Accordingly, future research could deal with an empirical research to detect actual behaviours consumer make about delivery choices and/or surveys of an experimental kind using consumers of different ages and countries.

No doubt, however, that a greater consumer involvement – both in terms of his preference knowledge, of more information delivery and of co-design of choice architecture and greener options – is essential in order to increase a really higher sustainability of such an important retail channel.

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