A Systematic Literature Review on Consumer Behaviour in Innovative Last-Mile Delivery

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Abstract

Purpose: The main purpose of this paper is to determine the current trend of study in innovative last-mile delivery and the factors that influence consumers' behaviour in innovative last-mile delivery.

Design/methodology/approach: This systematic literature review is guided by established guidelines and covers six important steps in the methodology: verification of established guidelines, creation of research questions, searching strategy (the process of identification, screening and eligibility) on a few reputable databases such as Scopus, Web of Science and also Google Scholar, continued with data appraisal, data extraction and data analysis. Research articles between 2017 and 2021 were gathered based on the selected keywords and inclusion criteria.

Findings: The findings revealed that most of the studies emphasised the antecedents of the initial use of innovative last-mile delivery. Intention emerged as the main dependent variable in many studies, followed by preferences, attitudes, and other variables. Meanwhile, the significant independent variable is from different factors such as technical factors, socio-economic factors, delivery factors, and others. In terms of the theory, the theory of planned behaviour was widely used in the selected studies compared to other theories.

Research limitation/implication: Through a rigorous systematic literature review, this study depicts the gaps in the studies of consumer behaviour toward innovative last-mile delivery.

Practical Implications: This study contributes to a deeper understanding of consumers' behavioural towards innovative last-mile delivery. The findings of this study are valuable not only to scholars but also to logistics practitioners and policymakers. This study could help guide the company and related agencies in increasing the intention and adoption of innovative last-mile delivery and successfully implementing new last-mile delivery solutions.

Originality/value: To the best of author's knowledge, little effort has been devoted to systematising the literature on consumer behavioral toward innovative last-mile delivery. This research helps to close this gap.

Introduction

In the era of e-commerce, it is common for people to purchase goods and services online. Globally more than two billion consumers bought products and services online in 2020, e-commerce sales have exceeded 3.5 trillion dollars, and the increase is expected to continue (Statistica, 2021). This trend has also been increased by the Covid-19 pandemic, which gives a higher demand for last-mile delivery services and a significant rise in direct-to-consumer deliveries (Viu-roig & Alvarez-Palau, 2020), particularly in-home delivery services. Last-mile is considered the last component or last stretch of the supply chain for the physical delivery of goods and requires a sequence of activities to complete the delivery to the destination specified by the recipient (Harrington et al., 2016; Lim et al., 2018)Last-mile delivery modes vary in terms of features and delivery efficiency (Wang *et al*., 2014).

Basically, in online business, last-mile delivery can be classified into three primary modes; attended home delivery (parcel sent directly to consumer's doorsteps), unattended delivery (parcel will arrange to be delivered at the collection centre or premises instructed by consumers), and delivery at pick-up stations (parcel is located at pick-up points such as lockers, shop, supermarkets or post office) (Nguyen, Leeuw, and Dullaert 2018). Although there are several modes to deliver products to consumers, traditional last-mile delivery (home delivery) remains the most preferred mode for delivery amongst consumers worldwide (Zhang, Zhu, and Ye 2016; Yuen *et al*. 2018). Morganti (2014) asserted that approximately 90% of online consumers would choose home delivery compared to other alternatives, for example, self-collection services.

Evolution of Last-Mile Delivery

Last-mile delivery has emerged in literature over the past three decades. Since then, studies about last-mile delivery have been explored by various scholars. The first breakthrough of the last-mile delivery system was initiated by Garr and Richer (1990) on television signal's vertical blanking interval (VBI). In the study, the television signal's VBI is used as the last-mile delivery system, providing a low-cost alternative for transmission system application. Meanwhile, Fairhurst & Matthews, (2003) study the use of digital video broadcast (DVB) to transmit internet protocol (IP) data. Studies on last-mile delivery in broadband access in the following years, especially in rural areas (Allen *et al*., 2007). This indicates that the initial study on last-mile delivery aims to identify appropriate methods to solve the problems of data transmission systems, networking, and accessibility in the context of television and broadband. In the following year, some studies on last-mile delivery regarding the effect of last-mile delivery activities on the environment (Edwards *et al*., 2010). Meanwhile, a study by Suh *et al*.(2012) focuses on decreasing the environmental effect connected with last-mile package delivery systems from online orders and studying how to improve last-mile delivery performance (Greasley, 2012).

In the past few years, research demonstrated the emergence of studies on last-mile delivery from the retailer and consumers' points of view (Lim & Winkenbach, 2019; Mangano & Zenezini, 2019; Zhang *et al*., 2019) and also increasing studies on innovative last-mile delivery such as a study on the scheduling of drones launched from delivery trucks (Boysen *et al*., 2018), explores the economic viability of a 'pony express' crowdsourced logistics project in a city (Seghezzi *et al*., 2020) as well as a regulatory framework for autonomous delivery robots for packages, with a focus

on legal issues (Hoffmann & Prause, 2018). Historically, the word last-mile comes from the telecommunications industry and is regarded as a network's last leg (Lim *et al*. 2018). However, in supply chain management and transportation planning, the term last-mile is used to characterise the flow of humans and products from a transport hub to the last destination (Edwards *et al*., 2010), where order placement and service encounters take place (Vakulenko *et al*., 2019). The last-mile or last leg is the most critical logistical process in the entire supply chain, especially in delivering the goods ordered online to the recipients (Zhang *et al*. 2016; Lim *et al*. 2018; Ranieri *et al*. 2018). Due to the rapid pace of the city and the increasing movement of goods, the logistics industry is faced with challenges and pressures of meeting consumer demands and pressures to address services in different ways and at the same time aimed at efficient delivery and reducing cost. All of this requires a continuous innovation process involving last-mile solutions that mitigate last-mile costs and, at the same time, will increase the standard-of-service level. Innovation is an idea, concept, method, or object seen as new by a person or group (Rogers, 1995). There are three categories of last-mile innovation: organisational, technology-enabled, and data-technique-enabled (Pan *et al*., 2017). The deployment of new last-mile organisation models or procedures was an example of organisational innovation in the first category. Meanwhile, the technology category includes automated collection services, parcel locker/ smart locker, self-collection points, drones, and autonomous vehicles. Meanwhile, data technique-enabled innovations are data methods (data mining, data analytics, big data, and so on) used to increase the effectiveness and efficiency of last-mile delivery. In the context of logistics service innovation, it refers to logistics-related services that are unique and useful to a certain audience, whether simple or complicated and helpful to a certain audience (Flint *et al*., 2008).

To respond to the growing fragmentation of shipments in the last stage of the supply chain caused by the growth of e-commerce, innovation in logistics last-mile delivery innovation is critical, particularly in the package delivery sector (Morganti & Dablanc, 2014). Mangiaracina et al. (2019) have identified several possible innovative solutions to overcome home delivery, such as reception boxes, collection points, crowdsourcing logistics, drones, robots, and smart lockers. These innovative solutions have been introduced to increase the efficiency of last-mile delivery and solve the problem related to traditional last-mile delivery. Among the most discussed innovative solutions, there are self-collection services or also known as parcel lockers (Chen *et al*., 2020; Y. Chen *et al*., 2018; Jiang *et al*., 2020; Oliveira *et al*., 2017; Vakulenko *et al*., 2017, 2019; Xueqin Wang *et al*., 2018b, 2018a, 2018c; Yuen *et al*., 2019, 2018; Zhou *et al*., 2020), autonomous vehicle (AVs) and robot (Pani *et al*., 2020; Yuen, Cai, 2020a; Yuen, Chua, *et al*., 2020b; Yuen, Wong *et al*., 2020c), drones (Hwang *et al*., 2020; Kim & Hwang, 2020; Zhu, 2019), crowdsourcing logistics (Gatta *et al*. 2019) and drop boxes (Risher *et al*., 2020).

These innovative solutions have been introduced to increase the efficiency of last-mile delivery and solve the problem related to traditional last-mile delivery. Considering innovative last-mile delivery popularity, the knowledge about innovative last-mile research from the consumer perspective is currently lagging in the literature. Although there is a large body of literature on innovative last-mile delivery, there has been little effort to review these works systematically, discover trends, and generate prospective themes. Specifically, the review procedures have not been fully handled, including identification, screening, and eligibility. Traditional literature evaluations have several concerns about bias and transparency. Many authors just select articles relevant to their field of study (Shaffril et al., 2020). As a result, future researchers will face a

challenge, especially in replicating the findings, validating the interpretations, and determining the extent to which a study is comprehensive (Shaffril et al., 2021).

Considering this gap in the literature, the present study intends to conduct a systematic literature review (SLR) that focuses specifically on the current trend of study and factors that influence consumers' behaviour toward innovative last-mile delivery. With this approach, the study's empirical evidence helps identify gaps and serves as a guide for future studies in this area. This paper systematically reviews literature from 2017 to 2021 on the service innovation of last-mile delivery from the e-commerce consumer's point of view. A special focus was given to e-consumers due to the increasing demand for e-commerce worldwide. Past studies have also shown that consumers should accept technology and should not be forced or will harm attitudes (Vakulenko *et al*., 2019). The outcome of technology is built on the preparedness of consumers. If the consumers are more prepared, they will have a better experience (Larivière *et al*., 2017). It is very important for the industry to comprehensively understand the consumer decision-making process (Narula & Desore, 2016) and realise that effective execution of the last mile of logistics innovation depends on consumer adoption of those new concepts (Xueqin Wang *et al*., 2018c). Interrelationships identified between the ideas can fill the gaps by exploring the extent of the validity of such interactions through the advancement of the consumer behaviour context. Hence, this review enables interested parties such as the logistics industry, policymakers, the public, and researchers to understand the elements that contribute to the undertaking of consumers on last-mile delivery innovation to develop strategies for increasing consumer acceptance and adoption of last-mile innovation and improving last-mile delivery services.

This study is structured as follows: Section 2 consists of the methodology part, which provides information on the established guideline used, formulation of research questions, searching strategy process, and quality appraisal. Section 3 consists of the study's results, followed by section 4, the recommendation for future study and finally, section 5 the conclusion.

Methodology
This part outlines the approach used to identify articles associated with consumers' behaviour on innovative last-mile delivery. This systematic literature review is guided by established guidelines by Saffril et al. (2020). The guidelines are based on six key components of SLR methodology: (i) the creation and verification of a review protocol/publication standard/reporting standard/guidelines; (ii) the formation of research questions; (iii) systematic searching strategy; (iv) quality assessment; (v) extraction of data; and (vi) data analysis.

Established Guideline For Developing The Current Systematic Literature Review
The established guideline by Shaffril et al., (2020) provides a general overview of the fundamental methodologies for systematic literature review and numerous possibilities or alternatives that non-health-related scholars might examine when planning and developing their systematic literature review (SLR). This guideline addresses the lack of methodological guidance and the adequacy of existing methodological references by offering a general understanding of basic SLR procedures that non-health-related researchers can use to guide their review. Even though various SLR standards are accessible for researchers, such as guidelines by Xiao and Watson (2019), the current guideline presents an interesting set of SLR standards from different perspectives and is suitable for social science study.

Guided by Shaffril et al., (2020), this SLR began with the research questions formulation. The next step was to establish the document search strategy, including identification, screening, and eligibility. This was followed by a quality appraisal method based on Mixed-Method Appraisal Tool (MMAT) by Hong et al. (2018). The current guideline looked at different methodological approaches, such as prioritising constructing a review protocol or referring to existing guidelines instead of developing the research question, presented more searching functions such as phrase searching, truncation, wildcard and field code functions, and show how important it is to use google scholar as a supporting database rather than the primary database in a systematic searching process.

Systematic literature reviews are useful methods for accurately and consistently summarising information. According to Sierra-correa, Ricardo, and Kintz (2015), this methodology offers a few unique advantages, such as 1) establishing specific research questions that will allow for a systematic search; 2) identifying the criteria for inclusion and exclusion, 3) assessing a large number of relevant scientific literature in a given time, and 4) it leads to increasing the rigour by utilising the statistics. Thus, the use of established guideline by Saffril et al (2020) in this systematic review contributes to a more precise search of the term related to consumers' behaviour on innovative last-mile and provide information in future last-mile innovation review.

Formulation of Research Questions

Writing clear and concise research questions in the early phase is crucial, which will guide the entire systematic review process. The research question formation for this study is based on the basic method and does not use the Research Question Development Tool (RQDT). The objective is to determine the current studies on innovative last-mile delivery from a consumer's perspective. In this regard, the research question (RQ) of the present study is as follows:

RQ1: What is the research trend in last-mile delivery innovation?
RQ2: What are the factors that influence consumer behaviour in innovative last-mile delivery

Process of Searching Strategy and Appraisal of Quality

The first stage is the identification of keywords based on the research questions and online treasures, keywords used by previous research, and keywords suggested by Scopus. The full search string was developed on Scopus and Web of Science database and used the boolean operator, phrase searching, and wild card to enrich the identification of keywords process (Table 1). These two databases are selected because they cover various fields such as science, technology, social sciences, and humanities. The articles available from the database are controlled in terms of quality and indexing more than 5000 publishers (Martín-martín et al., 2018). Apart from these two databases, Google Scholar has also been used as a supported database to search for articles. Furthermore, the search was also conducted using a manual search technique. "Handpicking" was used to find suitable articles from the google scholar database.

As a result of the search attempts, 67 potential publications were identified from the Google Scholar database. Haddaway et al. (2015) suggested that Google Scholar can be selected as an additional database because of google scholar's ability in a systematic literature process. Furthermore, Google Scholar can explore the web and index any related documents with an academic structure. This is in line with a suggestion by Martín-martín et al. (2018), who noted that in all areas, Google Scholar citation data is a superset of Web of Science, with significant

additional coverage. A total of 1203 articles were found in the search process on three databases, namely Scopus, Web of Science, and Google Scholar.

Table 1: The systematic review process's search string

Databases	Keywords
Scopus	TITLE-ABS-KEY (("last-mile" OR "last-mile deliver*" OR" final mile" OR "last stretch delivery" OR "final stretch deliver") AND ("innovat*" OR "transformation" OR "revolution" OR "consumer*" OR "customer*" OR "buyer" OR "user" OR "intention" OR "adopt*" OR "adapt")) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017)) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE, "English"))
Web of Science	TS=(("last-mile" OR "last-mile deliver*" OR" final mile" OR "last stretch delivery" OR "final stretch deliver") AND ("innovat*" OR "transformation" OR "revolution" OR "consumer*" OR "customer*" OR "buyer" OR "user" OR "intention" OR "adopt*" OR "adapt")) AND LANGUAGE: (English) *AND* DOCUMENT TYPES: (Article) Timespan: 2017-2021.

The second stage is the screening process. This procedure entails determining which studies should be considered for review. The screening procedure aims to reduce the number of articles to be examined and a manageable amount of articles for the reviewers. Okoli (2015) suggests researchers set a period which they can review. In line with the suggestion and to ensure the researcher can handle the articles, the inclusion and exclusion criteria were determined for this review process. This review only includes empirical data from article journals and excludes other articles such as conference proceeding papers and chapters in books. In terms of language, only an English article was chosen to avoid confusion, misinterpretation, and difficulties in the translation process. Next is related to the timeline; 5 years of articles are selected (between 2017-2021). The time frame between 2017 and 2021 was chosen because based on the pattern in the Scopus database, it was discovered that the article on customer behaviour on innovative last-mile delivery attracted the interest of scholars and the number of articles increased between 2017 and 2021. Moreover, it fits with a study's maturity concepts by Kraus et al. (2020). Hence, between 2017 and 2021, there are more relevant articles on innovative last-mile delivery, so much more topics are studied, and more evidence would be used. Hence, this period is considered appropriate to see developments in consumer behaviour towards innovation in last-mile delivery. Additionally, this review only focuses on research related to consumer behaviour in innovative last-mile delivery. A list of selection criteria is organised in Table 2.

Table 2: Selection Criteria

Criterion	Inclusion	Exclusion
Literature type	Indexed Journal	Non-indexed journals, Systematic literature review journals, chapters in the book, conference proceeding
Focus on last-mile delivery innovation	Research analysing last-mile delivery innovation from consumer's perspectives	Analysis from the point of view of logistics providers, e-retailing companies, and other parties
Repeated article	Research that repeated to other sites	Repeated articles published in a different journal (only keep the earliest one)
Language	English	Non-English
Timeline	Between 2017 – 2021	Year before 2017

After detailed examination, 1127 articles were excluded due to irrelevant, duplicated, and published in the form of conferences and chapters in the book. Only 59 articles are eligible to be reviewed. The next stage is the eligibility process, which involves full text of article access. To ensure the quality of the articles' content and avoid bias, the remaining 59 articles underwent a quality assessment from team members.

Quality Appraisal
The Mixed Methods Appraisal Tool (MMAT), by Hong et al (2018), was used to assess the quality of diverse research designs. The corresponding author then assessed each publication's methodological and analytical rigour with co-authors' help. Each publication was reviewed thoroughly, with special attention paid to the methodology section and the analyses performed. Every item was evaluated on five criteria, with three choices for expressing their responses: "yes," "no," and "don't know/can't tell." The author will discuss any disagreement before deciding which articles are included or excluded. This process excluded 25 articles due to the focus on last-mile innovation rather than last-mile delivery innovation, the focus on industry adoption of logistics innovation rather than e-consumer adoption of last-mile innovation, and the methodology is not clearly defined. Finally, the authors agreed and decided that 34 articles were eligible for the review. The flow of the search process is shown in Figure 1.
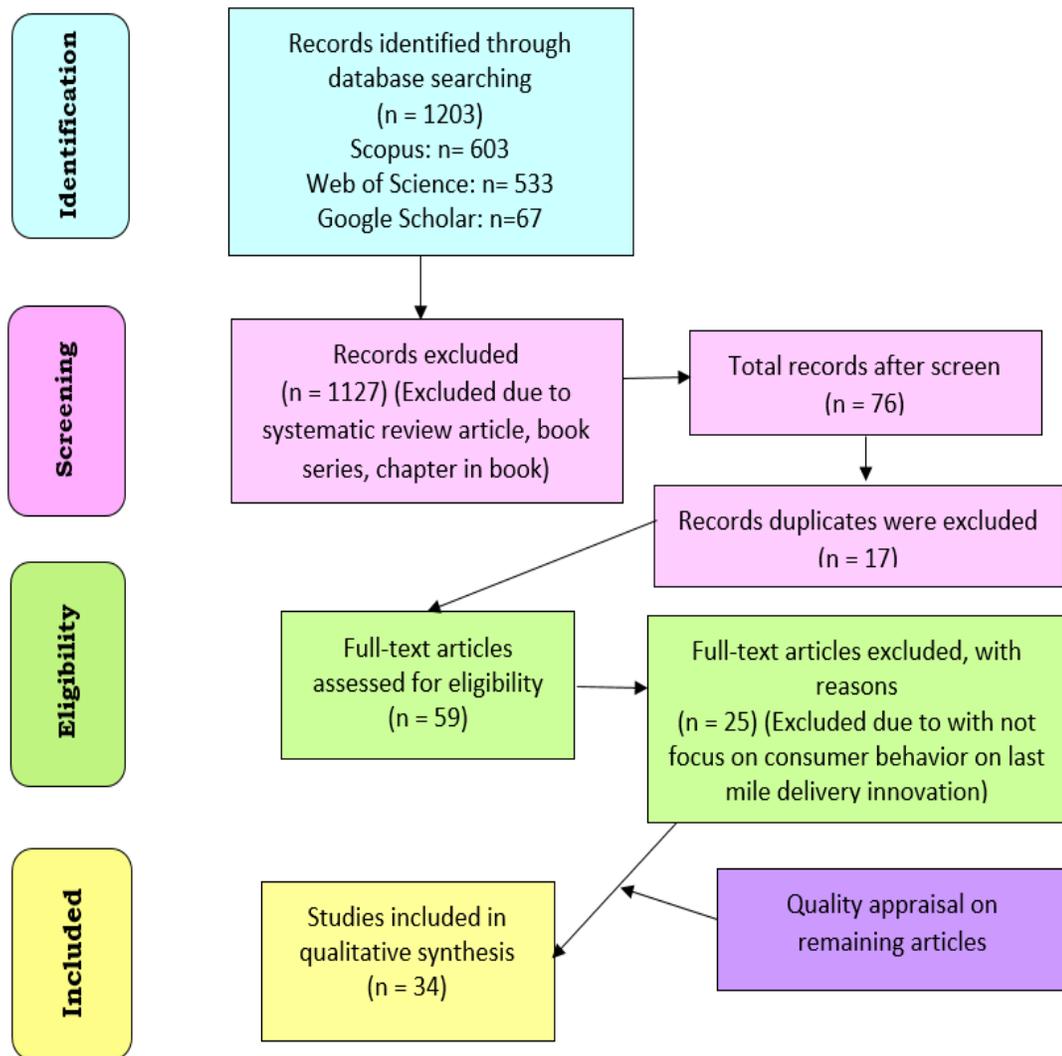
Figure 1: The flow of the search process
[adapted from Moher et al., (2009)]

Data Extraction and Analyses

Based on 34 articles, the author has performed a deductive thematic analysis. Within this technique, the theme was developed based on discussion among authors by relating to previously published articles. Based on this practice, the author has developed three themes: e-consumers' behaviour in the innovation of last-mile delivery service, methodological approaches in consumer behaviour, and theoretical lenses in the consumer behaviour context.

Findings
Research Trend in Last-Mile Delivery Innovation
From 34 articles, the most productive countries are China and Singapore with 6 articles (18% each), followed by the United States with 5 articles (15%), Sweden and Germany with 3 articles (9% each), South Korea, and Belgium with 2 articles (7% each), and other countries; Thailand, Brazil, Taiwan, Romania, Netherlands, Ukraine, and Spain only one article (3% each) as indicated in Figure 2.
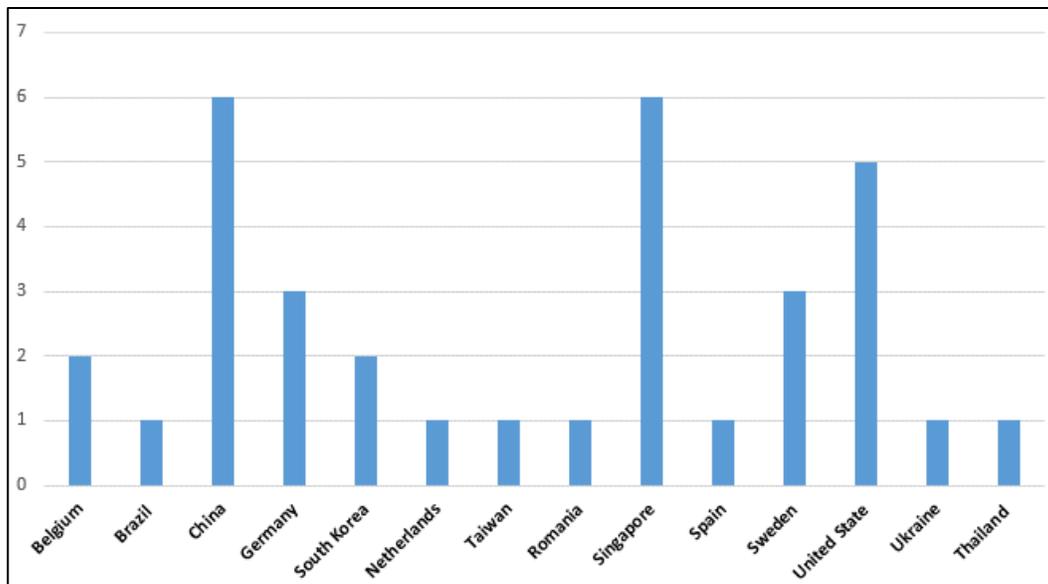

Figure 2: The Distribution of Articles According to Countries

European studies were among the most commonly researched regions (e.g., Germany, Romania, Netherlands, Spain, Belgium, and Sweden), followed by Southeast Asia (e.g., Singapore and Thailand), and East Asia (e.g.,Taiwan, China, and South Korea). A few studies in North America (e.g., United States of America) and South America (e.g., Brazil). This indicates that research on the last-mile from the standpoint of e-consumers is rather popular in Europe. Studies on innovative last-mile delivery have also attracted the attention of East Asia researchers. This is most likely due to the quick development of various online purchasing forms and the exponential expansion of e-commerce operations in such countries, particularly in China and South Korea. However, in South East Asia, the studies on this area are dominated by Singapore. More specifically, the growth of e-commerce in Southeast Asia is led by Singapore, with a growing rate of 20-25 %, compared to other Southeast countries (Ministry of Transport, 2019).
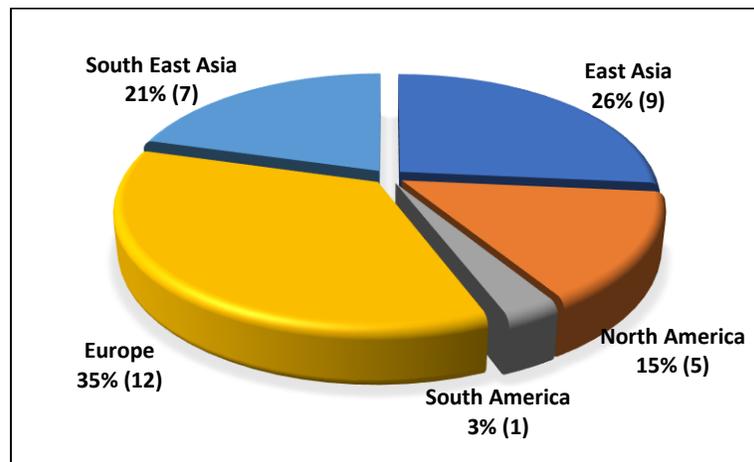
Figure 3: The Distribution of Articles According to Region.

The distribution of the literature in this study by year showed an interesting scenario. It was discovered that the study on consumer behaviour on last-mile delivery innovation was extensively published in the last five years, which is from 2017 to 2021. Only 2 studies were published in 2017, and 5 studies in 2018. This shows that research on last-mile delivery innovation from the consumer perspective is a relatively new research area. However, an increasing number of articles were published in 2019, 9 articles, and 10 in 2020. A review revealed a growing interest from researchers in studying last-mile delivery innovation from the customer perspective (Figure 4). Meanwhile, in 2021, only 9 articles been selected. However, the selection of articles for 2021 is minimal, as the selection was made before the end of 2021. It is expected that there will be more related articles this year. The selection of articles for 2021 ensures that the latest studies are also selected for this review. The increase in the number of last-mile studies was in line with articles in the logistics and supply chain field.
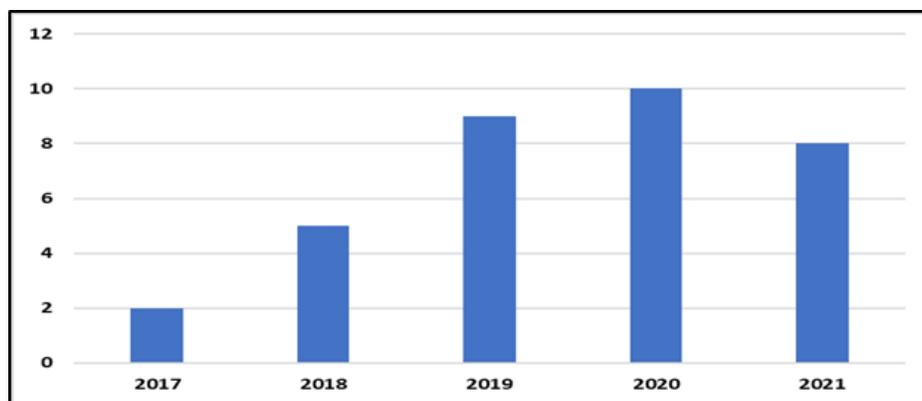

Figure 4: Year of Publication

Over the last five years, the study of consumers' behaviour towards innovative last-mile services has received attention. The articles have been published in various journals. The articles were chosen from 26 journals, in terms of the number of publications, none of which journal leading in studies of last-mile delivery. In addition, articles can be found from various disciplines, for instance, retailing and consumer services, distribution, transportation, logistics, economics,

environmental, sustainability, and others. For the time under consideration, nearly a third of these publications (85 %) only published one article on innovative last-mile delivery. Furthermore, the journal with the most articles is Retailing and Consumer Services Journal (5 articles), followed by the International Journal of Logistics Research and Applications (3 articles), International Journal of Logistics Management (2 articles) and Journal of Business Research (2 articles). The remaining articles were published in other journals such as Transportation Research (Part A, Part C, Part D, and Part E), Journal of Business Logistics, International Journal of Physical Distribution and Logistics Management, Journal of European Transport Research, and another journal (Table 3). These studies on last-mile delivery also interestingly revealed various types of innovation, where 50% of these articles explored self-collection services, rather known as automated parcel locker (APS). This is followed by 12% each for drones and 9% for crowdsourcing, 9% for autonomous delivery robots and autonomous delivery vehicles, and 6% for collection delivery points. Meanwhile, 12% focus on consumer preferences, delivery attributes, and combinations between customer delivery point and reception boxes, and home delivery and automated delivery station. The lowest quantity of studies was conducted in the areas of drop boxes, which is only 3%. This clearly shows that studies on a self-service collection such as a parcel locker attract researchers more attention than other innovative solutions. These innovations have captured the intention of e-consumers to utilise them, which makes it the majority of studied topics in last-mile delivery. There are several studies focused on examining consumers' perspectives towards the use of the alternative home delivery solution, for instance, automated delivery stations (Oliveira et al., 2017), autonomous delivery vehicles (Yuen et al., 2020), collection delivery points (Zarei et al., 2020) study on the combination of a delivery attribute (Nguyen et al., 2019) and study on customer preferences based on sustainability impact of last-mile delivery (Ignat & Chankov, 2019).

Methodological Approaches in Consumer Behaviour of Innovative Last Mile Delivery

This study focuses on the methodology used in previous studies to enable future researchers to identify often-used methods and fill the gap in existing methodology. Analytical models, conceptual models or frameworks, case studies, interviews, surveys, simulations, and others are all examples of categorised research methodologies (Meixell & Norbis, 2008). The most widely used approach is the quantitative research method which is 24 articles, as opposed to the qualitative method, which only consists of 2 articles. Meanwhile, 8 articles employed mix method. Most studies rely on a single method (26 articles), while (8 articles) are mixed methods. Hence, the survey design was included as one of the dominant research methods (24 articles), focus group interview (2 articles), a study combining the survey with simulation (3 articles), and also survey and modelling (5 articles) (Table 4). In addition, most of the review studies employed cross-sectional studies.

Most of the articles apply online surveys in conducting data through questionnaire surveys (59%). This is followed by an on-site survey (17%), a street intercept survey (9%), and a combination of online and offline surveys (9%), which consists of mail surveys and media social surveys, Facebook surveys, and face-to-face surveys. Meanwhile, only 2 articles (6%) of the 34 studies applied interviews to collect data. The online survey is the most highly used method compared to other methods. Compared to conventional paper-based and site surveys, online surveys have many advantages: the survey is not limited by geographical location, thus allowing for large sample size, the cost of the survey is low and fast responses (Bhattacherjee, 2001). Therefore, most studies now rely on online survey methods to collect data.

Table 3: Article Review Based on Journals

Journal	Year of Publication				
	2017	**2018**	**2019**	**2020**	**2021**
Economics Research- Ekonomska Istrazivanja					1
Electronic Commerce Research and Applications				1	
European Transport Research			1		
IEEE Access			1		
International Journal of Environmental Research and Public Health					1
International Journal of Logistics Management		1	1		
International Journal of Logistics Research and Applications					3
International Journal of Physical Distribution and Logistics Management			1		
International Journal of Retail and Distribution Management			1		
Internet Research		1			
Journal of Business Logistics			1		
Journal of Business Research	1		1		
Journal of Hospitality and Tourism Management				1	
Journal of Marketing Theory and Practice				1	
Journal of Retailing and Consumer Services			1	2	2
Research in Transportation Economics	1				
Sustainability (Switzerland)				1	
Technological Forecasting and Social Change				1	
Telematics and Informatics			1		
Total Quality Management & Business Excellence		1			
Transport Policy		1			
Transportation Research Part A: Policy and Practice					1
Transportation Research Part C: Emerging Technologies				1	
Transportation Research Part D: Transport and Environment		1			
Transportation Research Part E: Logistics and Transportation Review				1	
Travel Behaviour and Society Journal					1

Table 4: Methodologies used in last-mile innovation studies.

Research Method	Number
Quantitative method	24
Qualitative method	2
Mix method (Employing quantitative and qualitative methods)	8

Theoretical & Model Lenses in the Consumer Behaviour Context

The analysis of the consumers' behaviour adoption models used in these studies revealed a diverse collection of theories (Figure 5). Some researchers have used one particular adoption theory or an extension of theory, such as the Diffusion of Innovation Theory (DOI) (Yuen et al., 2018), the Unified Theory of Acceptance and Use of Technology (UTAUT) and UTAUT 2 (Kapser & Abdelrahman, 2020; Zhou et al., 2020), Theory of Planned Behavior (TPB); (Ignat & Chankov, 2019; Zarei et al., 2020), Mental Accounting Theory (Nguyen et al., 2019), Cognitive Consistency Theory (Zhu, 2019), Technology Acceptance Model (TAM) (Leon et al., 2021), Random Utility Theory (Rossolov, 2021).

Others combined different theories, such as DOI and Attitude Theory (Xueqin Wang et al., 2018a, 2018c), a combination of three theories which are Resource Matching, Perceived Value and Transaction Cost Economics (Yuen et al., 2019), and integration of Resource Matching Theory, Consumer Co-Production Theory, and Technology Readiness Model (Chen et al., 2018), or Attitude and Affect Theory (Xueqin Wang et al., 2018b), Norm Activation Model and TPB (Kim & Hwang, 2020) and combination of Resource Matching Theory, DOI, and TPB (Tsai & Tiwasing, 2021), incorporate of the theory of service quality and the quality logistics service evaluation model (LSQ) (Tang et al., 2021). Moreover, several researchers (Buldeo Rai et al., 2021; Devari et al., 2017; Hwang et al., 2020; Ignat & Chankov, 2019; Patowary et al., 2021; H. Zhu et al., 2019) have used self-constructed models (SCM). It consists of many independent variables from different models, theories, and frameworks.

Researchers frequently use several theories, either extensions or other theories or models. One of the interesting findings of this study is the widespread use of TPB in innovative last-mile delivery studies. The analysis of the literature has found that of 34 studies, 5 studies used TPB (Hwang et al., 2020; Ignat & Chankov, 2019; Kim & Hwang, 2020; Tsai & Tiwasing, 2021; Zarei et al., 2020), 4 studies used DOI (Tsai & Tiwasing, 2021; Xueqin Wang et al., 2018a, 2018c; Yuen et al., 2018) and the third theory that was included in the most-used theory is attitude theory (Xueqin Wang et al., 2018a, 2018b, 2018c), Resource Matching Theory (Chen et al., 2018; Tsai & Tiwasing, 2021; Yuen et al., 2019)—and also based on the value creation perspective (Risher et al., 2020; Vakulenko et al., 2017; Xueqin Wang et al., 2019).
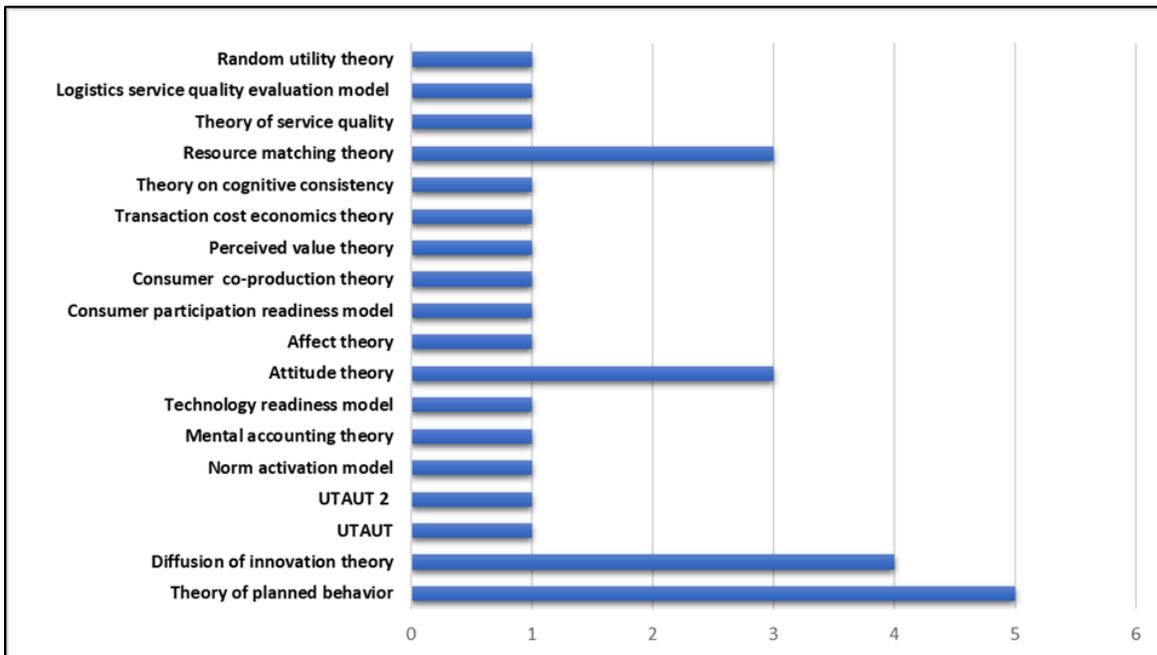
Figure 5: Theories used in the studies

Factors Influence E-Consumers Behaviour in Innovative Last-Mile Delivery

Several dependent and independent variables have been identified from the reviewed articles related to consumers' behaviour in innovative last-mile delivery services. Intention emerged as the main dependent variable in many studies, followed by preferences, attitudes, and other variables. Approximately 50% of 34 articles in this review focused on the antecedents of the intentions to use innovative last-mile delivery services (for example (Kapser & Abdelrahman, 2020; Leon et al., 2021; Risher et al., 2020; Tsai & Tiwasing, 2021; Yuen et al., 2019; X. Zhu, 2019).

Meanwhile, 18% of the studies focused on the antecedents of consumer preferences (Jiang et al., 2020; Nguyen et al., 2019; Oliveira et al., 2017; Zhu et al., 2019). Two studies investigate the antecedents of attitude (Buldeo Rai et al., 2021; Devari et al., 2017). Only one study investigates antecedents of consumer adoption (Wang et al., 2019). Besides that, some studies recommend a framework that investigates two dependent variable frameworks in the same framework, such as intention to use and usage behaviour (Zhou et al., 2020), and the study investigates intention to use and willingness to pay (Hwang et al., 2020).

There are a few significant independent variables such as relative advantages, complexity, compatibility, performance expectancy (PE), effort expectancy (EE), social influence (SI), hedonic motivation, price sensitivity, and perceived value (PV) as key factors in influencing consumers' behaviour intention on the use of innovative last-mile delivery services. For example, the intention to use self-collection services depends on the relative advantage, compatibility, and trialability (Yuen et al., 2018). Meanwhile, studies on parcel services' intention and usage behaviour significantly depend on the PE, EE, SI, and facilitating condition (FC) (Zhou et al., 2020). In addition, consumers' preferences for deliveries service are strongly influenced by service factors, socio-economic factors, and delivery factors (Zhu et al., 2019). A study on consumers' attitudes

towards engaging in social networks for package delivery is dependent on the attributes to perform crowdsourcing (Devari et al., 2017).

One study was identified that focuses on the adoption of innovative last-mile delivery (Xueqin Wang et al., 2019) and found that innovativeness, self-enhancement, green knowledge, and value perception is a factor that motivates consumers' adoption. Apart from that, some studies used mediator and moderator variables in their study. Attitude are found to be the most important mediator between consumers' beliefs and intention to adopt innovation (Xueqin Wang et al., 2018c). Meanwhile, compatibility, trialability, and complexity indirectly affect consumers' adoption intention through their attitude (Xueqin Wang et al., 2018a). A study by Chen et al., (2020) found that technology anxiety and service convenience fully mediate the effects of consumer participation readiness on usage intentions. Behaviour intention is also partially mediated between facilitation conditions and usage behaviour (Zhou et al., 2020). Meanwhile, perceived satisfaction also partially mediates the relationship between perceived risk and behaviour intention, facilitating condition and usage behaviour, and facilitating condition and behaviour intention (Zhou et al., 2020). In addition, perceived value and transaction cost mediated the relationship between convenience, privacy security, and reliability in consumers' intention to use smart lockers (Yuen et al., 2019). Meanwhile, for the moderator variable, perceived satisfaction significantly moderates the relationship between behavioural intention and usage behaviour (Zhou et al., 2020).

Limitations and Recommendations for Future Study

There are several limitations to this study. First, this review contains only empirical data from article journals and excludes other publications, including conference proceedings papers and book chapters. Therefore, it is recommended that future studies should obtain from multiple publications. The second limitation is regarding the use of a database for article searching. Gusenbauer and Haddaway (2020) proposed 14 databases that can be used to search for relevant papers. However, only two databases were utilised due to access restrictions: Scopus and Web of Science. More databases need to be used in the article search process to ensure more relevant articles that suit the study purpose can be reviewed. Third, the evaluation of the quality appraisal was solely dependent on MMAT. Examining the articles using a variety of quality evaluation instruments was predicted to reveal variances in article quality (Shaffril et al., 2021). Thus, it is recommended to use various quality appraisal tools available for future review.

Besides that, this review also would like to address the following suggestions to advance theory development in the context of consumer behaviour in last-mile delivery innovation. Several theories are frequently used in the articles reviewed. Among the theories, the most widely used theories are TPB, followed by DOI, Resource Matching Theory, and Attitude Theory. Some studies utilised non-theoretical frameworks, for example (Jiang et al., 2020; Oliveira et al., 2017; Pani et al., 2020). It provides opportunities for future research to improve their study by increasing the use of other suitable theories in the framework and construct of the study. Besides that, most of the theories used are from other disciplines. Hence, future research can consider enriching the use of theory by integrating this theory from multiple disciplines and, if possible, related to the theory of logistics and supply chain management.

Moreover, based on the review, there are limited social and environmental sustainability studies. For example, Ignat & Chankov's (2019) studies explore the impact of the environment and sustainability on last-mile delivery options. Meanwhile, some studies focus on environmental

behaviour in predicting the intention to use drones for food delivery services. Therefore, an additional study on environmental and social sustainability in last-mile logistics is required, as knowledge in this field is still lacking. Additionally, most studies focus on the intention to use, acceptance, usage behaviour, and adoption of consumers of innovative last-mile delivery services and exclude other important scenarios of the study, such as post-adoption, continuous usage, and commitment to innovative last-mile delivery. Since innovative last-mile delivery is still new, it would be meaningful if more studies could be done on customer experience for each stage, customer satisfaction, and value co-creation. Consumers' experience and satisfaction are significant variables that lead to continuous usage. Future studies that combine these elements will be able to add to the literature and also describe the changes and development of behaviour, particularly in innovative delivery.

Studies on this area are limited to a very specific geographical scope, such as Northern Europe (e.g., Germany, Romania, Netherlands, Spain, Belgium, and Sweden), East Asia (e.g., Taiwan, China, and South Korea), United States, and South East Asia Country (e.g., Singapore, and Thailand). The investigations are being done in several nations with diverse settings, limiting the generalizability of study findings (Wang et al., 2019). As a result, future studies may explore cultural, cross-country, and contextual factors impacting consumers' use of new last-mile delivery services rather than home delivery.

Quantitative methods and cross-sectional studies dominated these studies; thus, to avoid the occurrence of the individualist fallacy, the data for statistical analysis should align with the level of the variable of interest (i.e., measure the group variables, such as organisational climate, at the group level). It is proposed that future studies can diversify research methods such as mixed methods (MM) and multilevel mixed-method research designs (MMMRDs). A combination of qualitative and quantitative research methods can yield sophisticated and robust results. Meanwhile, MMRDs are widely used in various studies, especially in psychological studies. MMRD involves a combination of quantitative and qualitative studies, and data is collected at different levels of analysis; therefore, future research may test how the organisational level may affect the individual level in parcel delivery services. More importantly, there are several potentials for future research incorporating longitudinal mixed methods. It will address some of the constraints of common method bias.

Conclusion
The review investigated previous research on consumer behaviour concerning innovative last-mile delivery. This method allows gaps to be discovered and opportunities for future research to be identified. The quality of 34 articles was assessed in this study using an SLR technique. The emerging field of consumer behaviour in last-mile delivery research has grown to optimise home delivery solutions. However, for the past few years, academics and practitioners have paid close attention to innovative last-mile delivery studies, especially in e-commerce. Knowledge on innovative last-mile delivery is still dispersed, and researchers are beginning to recognise the need to expand knowledge and provide a clear direction for future study (Lim et al., 2018). Furthermore, studies on consumer behaviour towards last-mile innovation are still relatively new. Little is known regarding consumer behaviour regarding e-commerce logistics elements, and has rarely been addressed (Wang et al., 2018c). Therefore, understanding consumers' behaviour and responses to the service innovation is required to provide desired services that meet consumers' expectations. Overall, the outcomes of this study provide useful information not only to

researchers but also to logistics practitioners and policymakers to boost the intention and adoption of innovative last-mile delivery and successfully apply new solutions for last-mile delivery.

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