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A Systematic Review of Customer Switching Intentions Towards Sustainable Last Mile Logistics: The Role of Smart Locker Adoption

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Abstract:

Purpose - The accelerated rise of e-commerce has placed immense pressure on the world's last-mile logistics to become a cost-effective and environmentally sustainable activity. In response, one innovative solution to overcome this pressure has been the implementation of smart lockers since 2010. However, this research will be focused on the pros and cons of the technical characteristics of adopting smart lockers, neglecting the understanding of customer sentiments and behavioral outcomes towards the implementation of smart lockers. Hence, this research will identify the main factors that affect customers' switching intentions towards using smart lockers as a sustainable tool, through a bibliometric systematic literature review of previous research using the VOSviewer software.

Methodology – This research executed a bibliometric systematic literature review using VOSviewer software based on synthesizing the available papers from Web of Science (WOS) and Scopus. Consequently, 235 papers met the required criteria and were selected to be analyzed using a bibliometric visualization approach.

Results - The VOSviewer analysis yielded 172 relevant keywords, from which the most frequent keywords will be prioritized to identify the primary factors influencing customer switching intention. Consequently, the study directly highlighted key variables from well-established theories such as the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB). Specifically, clusters featured the following: “Perceived Behavioral Control”, “Attitude”, “Perceived Ease of Use”, and “Perceived Usefulness”, which strongly support the study's theoretical foundation. While the keywords "Privacy" and "Convenience" were not explicitly found, their indirect support implicitly links the identification of the behavioral constructs and the validation of the comprehensive nature of the research model.

Keywords - Technology Acceptance Model, Theory of Planned Behavior, Smart Lockers, Sustainable Last Mile logistics, Switching Intention.

1. Introduction:

The activity of the last-mile logistics represent a crucial and challenging component of urban freight transport (UFT), particularly with the exponential booming of e-commerce, which defined as the set of activities which are required for any delivery process starting from the “Endpoint of delivery” till reaching to the “customer's doorstep” of any supply chain (Yang et al., 2023). The landscape of last-mile logistics has previously been limited to the conventional physical last-mile logistics channels (Rita & Ramos, 2022). Due to the advancement of technologies and the fast-evolving digital societies, consumer behaviors in e-commerce environments have changed rapidly (Cai & Lo, 2020). These advancements will increase the number of touchpoints, channels, and different platforms at the retailer's disposal while interacting with their customers (Grewal et al., 2021; Tongkachok et al., 2022; Haddad & Nasib, 2023). Additionally, it shifts consumer expectations and gives them control of their experience, channel choices, and changes the way of searching and choosing any product or service (Nguyen et al., 2022). The online shopping services have become a requirement of modern life, and this has increased over time because of the lockdown period implemented in many countries because of COVID-19, and most industries have started to change their framework to e-commerce rapidly (Yang et al., 2023; Haddad et al., 2023). Alharbi et al., (2022); Ceccato & Gastaldi, (2023) state that this growth has increased emissions, fuel consumption, congestion, and delivery cost while increasing its impact on the quality of society's life; therefore, finding new alternatives to decrease and mitigate the impacts of last-mile logistics activities on all cities is necessary (Haddad, 2018). Consequently, the rise of e-commerce, resulted in a significant shift to other innovative solutions to be more efficient, such as adopting Smart Lockers (SL) as an unconventional sustainable delivery method (Tyrväinen & Karjaluo, 2022).

Smart Lockers are defined as “Automated Parcel Stations” operated as a self-service technology for last-mile deliveries. These lockers reduce delivery cost, delivery failures, and carbon emissions, reduce traffic volumes and road congestion, and can achieve higher delivery rates (Ulmer & Streng, 2019).



Although there has been an expanding growth in e-commerce, these firms are facing difficulties in delivering orders to customers' residences in an efficient and timely way (Fabre et al., 2019). On the other hand, the rate of failed deliveries and returns attempts in the Middle East and North Africa (MENA) region represents five times the rate of the global average which will not result in a loss of sales only but will increase dissatisfaction perception in the customer, Moreover, most of the customer around 62% of them preferring to pay cash on delivery over using any electronic payment due to their concerns about fraud and delivery reliability (Fabre et al., 2019).

This research has a theoretical contribution in the understanding of the influence of the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) by demonstrating its flexibility in a new geographical and technological context, such as implementing smart lockers in Egypt. It reinforces that the perceived behavioral control factor is a multidimensional factor that is influenced by external factors such as convenience and privacy, which will provide a more comprehensive view of understanding the technology adoption in a modern environment. On the other hand, it provides critical insights for last-mile logistics companies and a clear roadmap to drive adoption and acceptance. Companies in Egypt should prioritize not only the usefulness and ease of use gained from their smart locker systems but also focus on strategic placement to maximize convenience and privacy, to build customer trust, and to mitigate privacy concerns. By addressing these factors, these companies will effectively overcome the last-mile logistics barriers and will promote a sustainable delivery method that will align with the national environmental and social goals.

This research's purpose is to highlight the main factors impacting the consumers' switching intentions towards sustainable last-mile delivery options using smart lockers for any forward or reverse fulfillment processes to improve sustainable last-mile logistics practices in Egypt in the long term. A Bibliometric systematic literature review tool will be used to achieve the paper's aim through VOSviewer to provide a detailed quantitative analysis of resources from both Web of Science and Scopus databases.

The following are the formulated questions for the Bibliometric systematic literature review:

RQ1. What are the key enablers and barriers for consumers to adopt smart lockers versus other last-mile logistics globally?

RQ2. What is the status of the Egyptian unconventional last-mile delivery options and open-access distribution channels?

RQ3. According to the Theory of Planned Behavior (TPB) and the Theory of Acceptance Model (TAM), what are the main variables that will influence consumers' switching intention towards smart lockers for their deliveries?

The structure of this research will be as follows, the next section represents the identification of using smart lockers as a sustainable last-mile logistics tool in the e-commerce context, with a specific focus on the variables related to the Technology Acceptance Model theory (TAM) and the theory of Planned Behavior (TPB), the following section will provide a detailed procedures of the Bibliometric Systematic Literature Review steps, outlining the main strategy used to collect and analyze the literature. This is followed by the quantitative and qualitative analysis, which represent the key findings from the bibliometric analysis. Finally, this paper will conclude by summarizing the research's key contribution and providing recommendations for further research.

2. Conceptual Foundations of Adopting Smart Lockers as a Sustainable Last-Mile Logistics Tool:

The frequently used definition for sustainability is the development that matches existing requirements without undermining the ability to meet future needs (Aras & Crowther, 2013). Ignat & Chankov, (2020) state that the sustainability concept from the last-mile logistics perspective is categorized into three main dimensions. Nguyen et al., (2019) mentioned that the first dimension is the "Economic Sustainability", which mainly consist of three categories: Speed, Cost, and delivery options The second one is the environmental sustainability that deals with the CO2 emissions, greenhouse gases, product packaging, which are not returnable packaging, and noise pollution (Freitag & Kotzab, 2020). Lastly is the social sustainability that can be analyzed from two perspectives: from the drivers' perspective, the social sustainability is



related to the working and employment conditions, and benefits, and from the public perspective it can be related to the number of accidents, traffic congestions and the waiting time in public transport (Ducarme, 2019; Ignat & Chankov, 2020).

McLeod et al., (2020) stated that Smart lockers can provide environmental and operational gains through consolidating freight activity by increasing vehicle loads, which contributes to greater economies of scale and reducing the number of less-than-loaded trucks, the number of kilometers travelled for each truck, and the associated emissions. In addition, Smart Lockers can consolidate the last meters of the delivery chain for locations or destinations where merging truck loads may not be feasible. Additionally, it could be placed in buildings, gas stations, physical retail stores, malls, and any public hubs (Ranjbari et al., 2023).

By applying these smart lockers, logistics service providers will transport parcels directly to hubs in each city, where they are securely stored until each consumer decides to pick their parcels up at their convenience. In that case, the last-mile delivery is transferred to the recipient's responsibility from designated hubs (Niemeijer & Buijs, 2023). Hence, after placing customers' parcels in the locker, each consumer will receive a message with a detailed necessary information to pick up their packages, additionally, this message will include the date it will be ready for pickup, the locker's location, and an access code, and after they entering that access code the smart locker will be opened automatically and the customer can collect his parcel, then the customers simply could enter the code to retrieve their parcel which considered as a safer and convenient delivery solutions than home delivery solutions, particularly for online consumers and mainly for busy people who may not be available during delivery hours (Wang et al., 2020).

Smart Lockers are popularized by their benefits for the carrier and the consumer. From the carrier's perspective, this new delivery method will reduce the rate of failed first-time orders, which are caused by some difficult issues, such as difficult-to-access locations (Yuen et al., 2018). By implementing these lockers, the carriers now have an option to skip the unnecessary delivery attempts that may be caused by customers who

are not available at home and will ask for another delivery attempt (Behnke, 2019). Additionally, logistics carriers will take fewer road trips than before, as the implementation of these lockers will prevent them from driving to each customer's location, and the carrier will consolidate these parcels into one location (Yuen et al., 2018). Consequently, these consolidated parcel lockers will increase the efficiency rate of the last-mile logistics operations, the order fulfillment rate, and reduce transportation costs, avoid useless time, reduce traffic congestion, reduce noise pollution, and reduce emissions (Wang et al., 2020). Zhou et al., (2020) mentioned that with the adoption of self-service points will cut around 30% to 45% of the shipping cost compared with the home delivery cost.

From the customer's perspective, the implementation of these smart lockers will offer them the flexibility to pick up their parcels whenever they want at their convenience time instead of waiting for the delivery man at home, since the most of these lockers can be accessed 24/7 and the customer has the opportunity to decide the suitable time for collection, which will enhance his satisfaction and reduce the opportunity cost which caused due to non-deliveries or waiting long times till receiving the parcels (Yuen et al., 2018). And this increase of interest in using this service has increased the network of the smart lockers existing globally (Vakulenko et al., 2018).

However, most of the consumers who are still hesitating in using this new innovative delivery solution as an alternative to the home delivery method (Asdecker, 2021). Therefore, each logistics service provider needs to motivate their customers through clearly illustrating the advantages of using these lockers and providing additional incentives to persuade consumers to use another alternative solution (Xueqin Wang et al., 2020). Most of the online shoppers are cost-sensitive, and when they find a price difference of more than 4\$ between using these lockers and delivering this product at home, most of the customers will choose to switch to this option (Zhou et al., 2020).

Over the years, particularly with the expansion of e-commerce and the new advancement technologies adopted, such as the Internet of Things (IoT), the smart lockers started to be operated by smart devices and the IoT technology (Shang, 2017; Qian et al., 2025). To avoid adopting these



smart lockers with only mobile applications while managing the receipt processes, the implementation of IoT technology for wireless communications will be required to monitor, recognize, and manage all express shipments based on IoT technology with a PC server (Pang, 2018). A lot of literature has proposed the development of these smart lockers, started by Arora, Srivastava & Majumder (2017), who suggested implementing 3D connectivity, weight capture, CCTV camera monitoring, GPS, and multiple payment methods for these lockers. Sangiampak et al., (2019) mentioned another way to improve the software by offering another solution for these lockers, which can be unlocked by scanning a QR code. Mostakim et al., (2019) suggested implementing Internet of Things technology in these smart lockers using a one-time password (OTP) service and face recognition to increase their safety, user-friendly mechanism, and authenticity.

Most of the literature on smart lockers has analyzed the implementation of these smart lockers from the perspective of the main theoretical framework, which includes the TAM and the TPB theory, to understand the user behaviors through adopting a new delivery channel (Mitrea et al., 2020).

2.1. Theory of Planned Behavior (TPB):

Which is considered as an extension of another theory called the Theory of Reasoned Action (TRA), which focuses on attracting attention in social psychology, and both offer a designed conceptual framework to explain motivational and informational influences on consumer behavior, as both theories confirm that any customer makes any behavioral decisions based on a consideration of the available information (Ajzen, 1991). Since the idea of TPB first appeared in 1985, this theory has become one of the most widely influential and used models to analyze human social behavior (Ajzen, 2011). Nowadays, the TPB theory is used to analyze and determine various behaviors, such as pro-environmental behaviors as mentioned by Yuriev et al., (2020), the prediction of the green product consumption rate (Paul et al., 2016), or the usage of alternative modes of transportation (Hwang et al, 2021).

In the TPB, three distinct determinants influence intention, which are composed of perceived behavioral control (PBC), attitudes, and subjective norms (SN) towards the behavior (Ajzen, 1991). The extension from TRA to TPB is proven to be crucial, and this is due to the limitation of models dealing with behaviors that individuals have incomplete control over. Therefore, the PBC influence increased by 6% on average of the intention's prediction over subjective norms and attitude (Armitage & Conner, 2001). Therefore, to strengthen the intention to switch to smart lockers as a sustainable last-mile logistics practice, efforts should be focused on enhancing subjective norms, improving attitudes towards their use, and strengthening perceived behavioral control.

Firstly, Attitude is one of the main determinants of intention in the TPB and is defined as “the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question” (Ajzen, 1991). Tommasetti et al., (2018) defined it as “predisposition to interact in a predictably favorable or unfavorable way with an object, person, or situation”. Attitude is considered as the most crucial factor which is used to determine the consumer behavior, that’s why most of the last mile logistics companies are searching for new strategies that can change and determine individuals’ attitudes towards their products and services, as understanding customers' attitudes will increase behavior prediction accuracy and their ability to modify consumers' attitudes towards a desired behavior (Barber et al., 2009).

Secondly, Fishbein & Ajzen, (1975) described the subjective norm as the “person’s perception that most people who are important to him think he should or should not perform the behavior in question”. It is representing the social pressure perception on whether to conduct a specific behavior or not (Ajzen, 1991). It indicates the influences of others on the customers and the perception that a specific behavior is projected by the people who are important to the customers, such as close friends and family (Tommasetti et al., 2018). Ajzen, (2002) has mentioned that normative beliefs are the normative expectations of other important individuals, such as family, friends, or supervisors, reflecting the subjective norms of others' approval or disapproval of any behavior. These normative beliefs, in turn, lead to subjective norms.



Hence, it will refer to whether those important individuals would accept any targeted behavior or not to avoid social rejection or to gain social approval (Conner & Norman, 2005).

Lastly, the Perceived Behavioral Control (PBC), when the customers perceived the difficulty or the ease of doing any behavior (Ajzen, 1991), is considered an important determinant of intention in the TPB when dealing with behaviors under self-control (Paul et al., 2016). Ajzen, (2002) mentioned that the determinant of PBC assumes that most human behaviors are under self-control, which could be predicted through intentions only. Which means that the PBC is determined through merging the beliefs about what inhibits or enables a specific behavior, and how these factors are perceived can affect the improvement or constrain the execution of any behavior (Nguyen et al., 2015).

2.2. Technology of Acceptance Model (TAM):

This theory's theoretical roots were from the Theory of Reasoned Action (TRA) and provide a powerful explanation for adopting any new technology by positioning the customers' behavioral intention to use this technology, particularly through two core factors, the Perceived Ease of Use (PEU) and Perceived Usefulness (PU) (Ho et al., 2015). This model was developed to respond to a pervasive challenge in the 80s, which is the outright failure and the frequent underperformance of any new technology due to customer resistance (Hua & Wang, 2019).

Perceived Usefulness (PU), which focuses on the degree to which customers believe that a particular system or technology will improve customer's performance and experience and will help them to achieve a desired outcome (Lee et al., 2015). In that case, they believe that adopting smart lockers will streamline the processes of receiving their packages without any missing deliveries, inconvenience, or the risk of package theft. Today's researches extend the concept of the "Perceived Usefulness" beyond personal convenience to a broader societal values, as consumers may view smart lockers' positive contribution to sustainability that will encompass the sense of positive collective contribution that can be a significant factor for the environmental conscious users, through reducing failed deliveries or repeated delivery

attempts which will reduce carbon emissions and urban congestion in return (Chin & Lin, 2016). USE describes the degree to which customers believe that using a particular technology will require minimal effort, through the clarity of the instructions for package receipt, the simplicity of the application's interface, and the seamlessness of the physical interactions with the smart locker unit, As well as, the user friendly design of these smart lockers to reduce cognitive load related to learning or using these lockers which could be a key barrier of adoption (Mitrea et al., 2020).

This construct is linked conceptually with the psychological principle of "Self-Efficacy" when customers believe in their own capabilities to perform any task successfully without any effort. Therefore, adopting any technology will be accepted, not only when determining its benefits but also when they confident in their ability to deal with it, and any unreliable or complex interface will lead to frustration and a potential rejection of adopting any technology. (Yuen et al., 2019).

3. Procedures of the Bibliometric Systematic Literature Review:

This research's purpose is to investigate customers' switching intentions toward sustainable last-mile logistics options in Egypt, particularly the adoption of smart lockers, utilizing the TPB theory and the TAM theory from the final consumer's perspective. Therefore, as recommended before by Gülpınar & Güçlü, (2013); Barlow et al., (2017); Marcolino et al., (2018), the qualitative research tool to serve the research's purpose is the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) diagram to clarify the process of identification, screening, and exclusion of all papers. Accordingly, to conduct this systematic review, this research followed the steps suggested by (Moher et al., 2009).

Firstly, all keywords, investigated databases, and research methods must be determined. Thus, there are two electronic databases used, which are Scopus and Web of Science (WOS), to include all published work with the same scope of this research, as both provide journal citation data, which might be used for any bibliographic analysis and to reduce the risk of missing any publications.



Afterwards, the online research was conducted in all fields, such as title, keywords, topic, abstract, and full text, while including only the published literature in English within the time span from 2018 till 2025 (Barlow et al., 2017).

- The following is the search string for both WOS and Scopus databases;
 1. Key words (“Smart Lockers” OR “Parcel Lockers” OR “Automated Parcel Machine”) AND (“Theory of Planned Behavior” OR “Theory of Acceptance Model”).
 2. Key words (“Last mile delivery” OR “Sustainable logistics”) AND (“Theory of Planned Behavior”).
 3. Key words (“Last mile delivery” OR “Sustainable logistics”) AND (“Theory of Acceptance Model”).
 4. Key words (“Smart Lockers” OR “Parcel Lockers” OR “Automated Parcel Machine”) AND (“Last mile delivery”).

Accordingly, the results from the identification phase are 652 papers (305 papers for WOS and 347 records for Scopus), including all paper types and subject areas related to TPB theory, the TAM theory, switching intention towards smart lockers, and sustainable last-mile delivery.

3.1. Formulating the PRISMA Flow Diagram:

A crucial part of the review process is distinguishing between high-quality and low-quality research studies. The aim is to base the results on the most reliable studies available. To aid in this, Microsoft Excel was utilized to eliminate duplicates and streamline the screening process. After removing duplicates, 477 papers remained, which were then further evaluated to select the most pertinent documents (Castaneda et al., 2018). In the final stage, a researcher should concentrate on the most substantial and high-quality papers, using it as a benchmark for comparing other studies. Consequently, for the eligibility, the 477 papers were re-evaluated (Pham et al., 2019) through analyzing full texts, titles, and abstracts, with each paper assessed independently (Marcolino et al., 2018). After applying the eligibility criteria related to

the research questions, 163 papers were excluded due to full-text unavailability, and 79 papers were excluded due to their irrelevance to the research's main objectives (Bastas & Liyanage, 2018). 235 studies were included in this synthesis. The following (Figure.1) represents the flow diagram, illustrating the processes of identification, screening, and exclusion, as outlined in the PRISMA guidelines by (Moher et al., 2009).

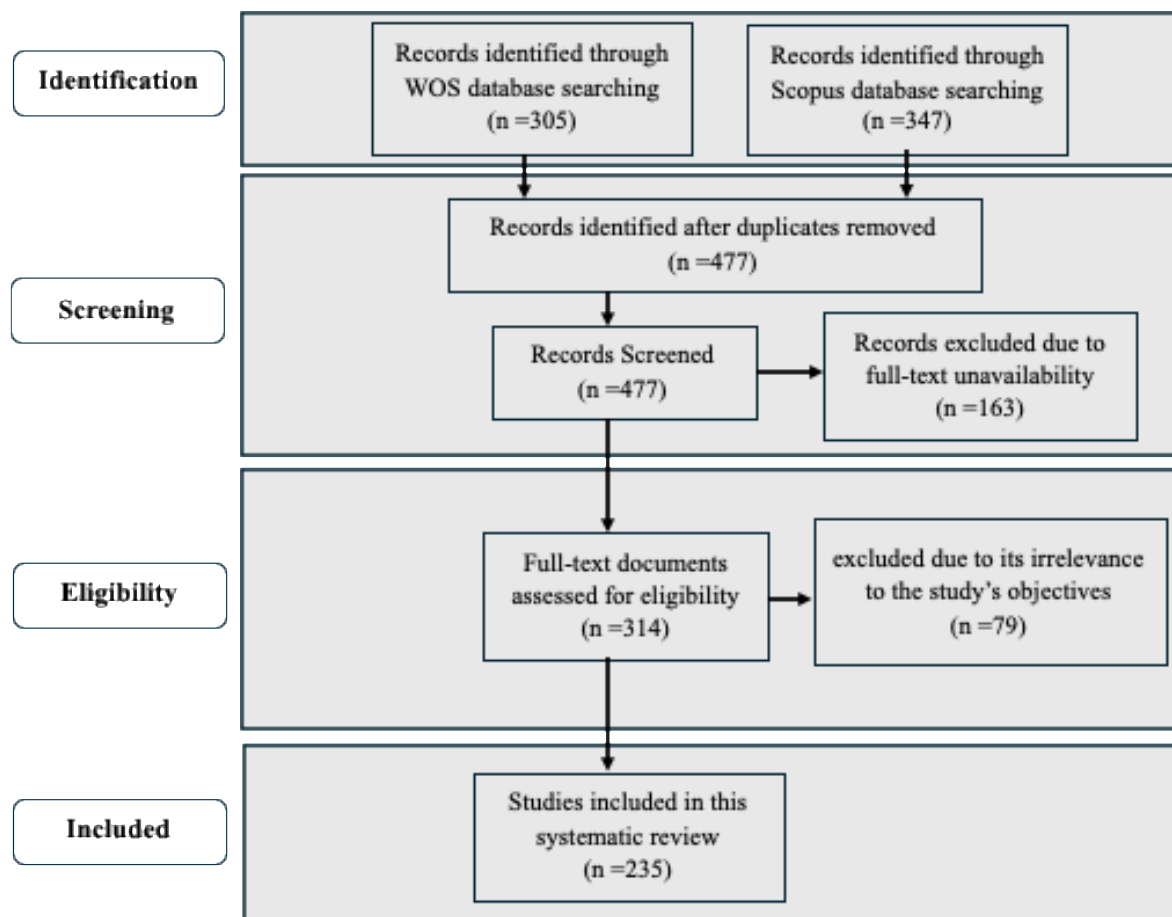


Figure 1: The PRISMA Flow Diagram

3.2. Quantitative Systematic Literature Review Analysis:

This research has focused on providing the papers to be analyzed systematically between the time span from 2018 to 2025, which is mainly represented as an e-commerce and logistics transformative period, which was shaped by a significant global event such as COVID-19. So, to investigate customer switching intention towards adopting new delivery methods such as smart lockers, it is crucial from the beginning to highlight the market drivers and the shift in



consumers' motivations in each phase (Rokicki et al., 2022). The following (Figure. 2) represents the number of published papers provided each year from 2018 to 2025.

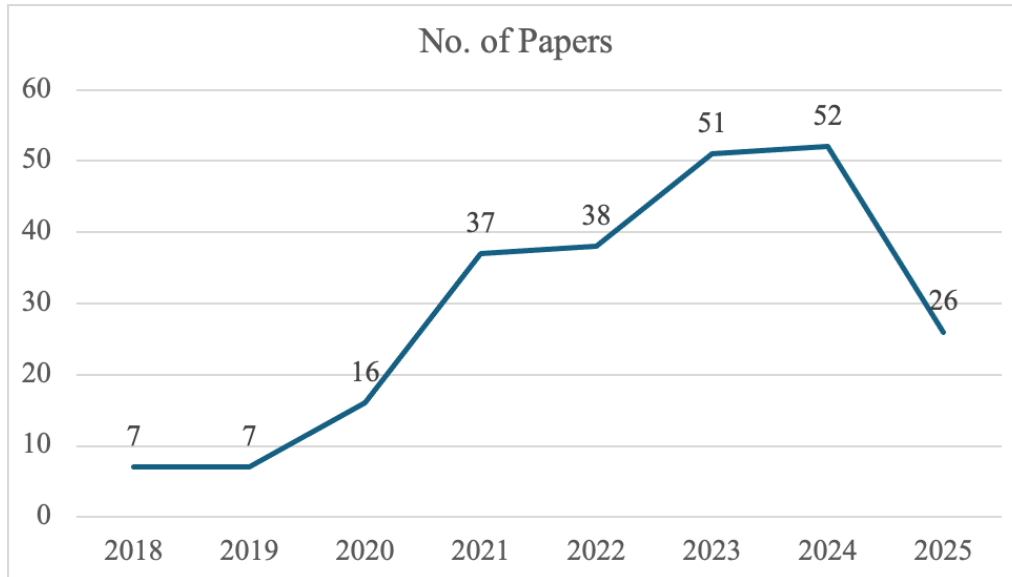


Figure 2: Number of papers provided each year from 2018 to 2025

The period from 2018 to 2019 serves as a critical baseline in consumer behavior as it represents a stable environment before the major external event that redefined consumer priorities and the technology acceptance (Maryati, 2020). From 2020 to 2022, mainly during the COVID-19 lockdown, the e-commerce sales saw a record-breaking jump, and the last-mile delivery solutions have changed with stay-at-home deliveries and safety concerns required. This unexpected increase in sales has already faced great challenges, including the time taken to deliver parcels, truck capacity deficiencies, and driver shortages (Campisi et al., 2023). Therefore, this period was defined by an urgent and shifting demand for contactless solutions. Consequently, the core value proposition of adopting smart lockers was not only to rely on its convenience, but also the necessity for safety and health, which will decrease human-to-human interactions during package retrieval (Wahab et al., 2025). From 2023 to 2025, and mainly due to the decreasing effect of COVID-19, e-commerce sales have continued their upward growth, setting new last-mile complexities as customers' demands have changed (Adeniran et al., 2024). They are now keen on sustainability rather than being sensitive to cost, seeking

environmentally friendly products and delivery methods, and increasing the focus on green logistics, including route optimization, sustainable packaging, and deployment of new contactless and sustainable last-mile logistics methods particularly the adoption of smart lockers (Jayarathna et al., 2023).

Secondly, the quantitative analysis is related to identifying the 10 most cited articles in both WOS and Scopus, as presented in Table 1. Vakulenko et al., (2018) explore the consumers' value perception in adopting smart lockers, which reshapes the experience of returns and delivery in the e-commerce context in last-mile logistics. Wang et al., (2018) examined the customer behavioral impact of adopting the Automated self-service station. Yuen et al., (2019) analyze the main factors of customers' switching intentions in using smart lockers for their deliveries. Viu-Roig & Alvarez-Palau, (2020) explore the e-commerce impact on last-mile deliveries based on the triple bottom line (TBL) of sustainability, which relates to the planet, people, and profit. Ignat & Chankov, (2020) investigate whether customers are willing to change their usual preferred delivery method when they are aware of the required information related to the social and environmental impact of the available last-mile delivery option. Bosona, (2020) identified the main barriers of urban freight last-mile logistics and its enablers for intervention. Tsai & Tiwasing, (2021) integrate the innovation diffusion theory, resource matching theory, and theory of planned behavior to clarify consumers' intention in utilizing smart lockers in Thailand. Tang et al., (2021) investigate the effect of the theory of service quality on adopting new technologies, such as smart lockers, and the customer satisfaction effect. Seghezzi et al., (2022) investigate the economic performance of e-commerce last-mile delivery in both options, traditional home delivery and smart lockers, in both rural and urban areas, particularly in the B2C context. Iannaccone & Gatta, (2021) investigate the use of both home deliveries and parcel lockers, forecast their future market shares, and analyze and compare the consumer preferences for different collection strategies.



Table 1: Top 10 most cited articles in both WOS and Scopus

Item	References	Title	Year	Cited by	Publisher
1	(Vakulenko et al., 2018)	What's in the parcel locker? Exploring customer value in e-commerce last mile delivery	2018	194	Elsevier
2	(Wang et al., 2018)	An innovation diffusion perspective of e-consumers' initial adoption of self-collection service via automated parcel station	2018	163	Emerald
3	(Yuen et al., 2019)	The determinants of customers' intention to use smart lockers for last-mile deliveries	2019	151	Elsevier
4	(Viu-Roig & Alvarez-Palau, 2020)	The Impact of E-Commerce-Related Last-Mile Logistics on Cities: A Systematic Literature Review	2020	132	MDPI
5	(Ignat & Chankov, 2020)	Do e-commerce customers change their preferred last-mile delivery based on its sustainability impact?	2020	119	Emerald
6	(Bosona, 2020)	Urban Freight Last Mile Logistics-Challenges and Opportunities to Improve Sustainability: A Literature Review	2020	119	MDPI
7	(Tsai & Tiwasing, 2021)	Customers' intention to adopt smart lockers in last-mile delivery service: A multi-theory perspective	2021	109	Elsevier
8	(Tang et al., 2021)	Consumer perceptions to support IoT based smart parcel locker logistics in China	2021	80	Elsevier
9	(Seghezzi et al., 2022)	Parcel lockers vs. home delivery: a model to compare last-mile delivery cost in urban and rural areas	2022	61	Emerald
10	(Iannaccone & Gatta, 2021)	What Young E-Consumers Want? Forecasting Parcel Lockers Choice in Rome	2021	56	MDPI

3.3. Bibliometric Data Analysis Using VOSviewer:

Bibliometric data analysis is a tool used in analyzing any publications, articles, and books through using specific metrics like the frequency of keywords, and the growth of all publications annually through a specific

time span, to identify research interest, gaps, and the active journalism authors, institutions, and countries (Sweileh, 2019). Moreover, as per Shah et al., (2019), it can help identify the origin and significance of any concept. Therefore, to analyze these bibliometric networks, the unified approach called VOSviewer software can be adopted to visualize the main similarities and to cluster the networks through maps introduced by Waltman et al., (2010). VOSviewer software has become the most used tool for analyzing all papers and visualizing their relationships among the most keywords occurred (Su et al., 2018). As mentioned by Liao et al., (2018), it has several advantages, such as its friendly graphical user interface that eases the way of generating the required maps, its powerful functions, such as co-occurrence and coauthor techniques for analyzing any paper through its titles, abstracts, co-citation, and keywords. VOSviewer maps usually represent only one item, which is the object of interest, such as research, publications, or terms, and between any pair of these items, there can be a link of connection that explains the strength of the relationship between these two items, each link's strength represented by a numerical value. Therefore, the higher this value is, the stronger this relationship (Van Eck & Waltman, 2019). Moreover, researchers can identify various clusters of common related items, each marked by the same color. The size of an item indicates the significance and popularity relative to other papers (Shah et al., 2019). Consequently, this conducted review was used to create bibliometric diagrams for visualizing the analysis using the full counting method. This review utilized VOSviewer software to generate two types of bibliometric mapping analyses: co-authorship and keyword co-occurrence.

3.3.1. Co-authorship Analysis of Authors:

It is one of the most important components in bibliometric analysis, and it is made up of researchers based on the number of publications they have published together. Therefore, the co-authorship map provides significant knowledge related to the researchers' contribution particularly in a specific field of research, which gives the researcher the applicability to find any opportunity of collaboration, promoting research innovation, sharing knowledge, and improving the quality of



their research (Pereira et al., 2019). as per Van Eck & Waltman, (2019) each link in this map connects two items that represent the relationship between authors. Accordingly, in this research, the minimum number of authors used is "One", and the minimum number of citations of an author is "One" as the threshold level.

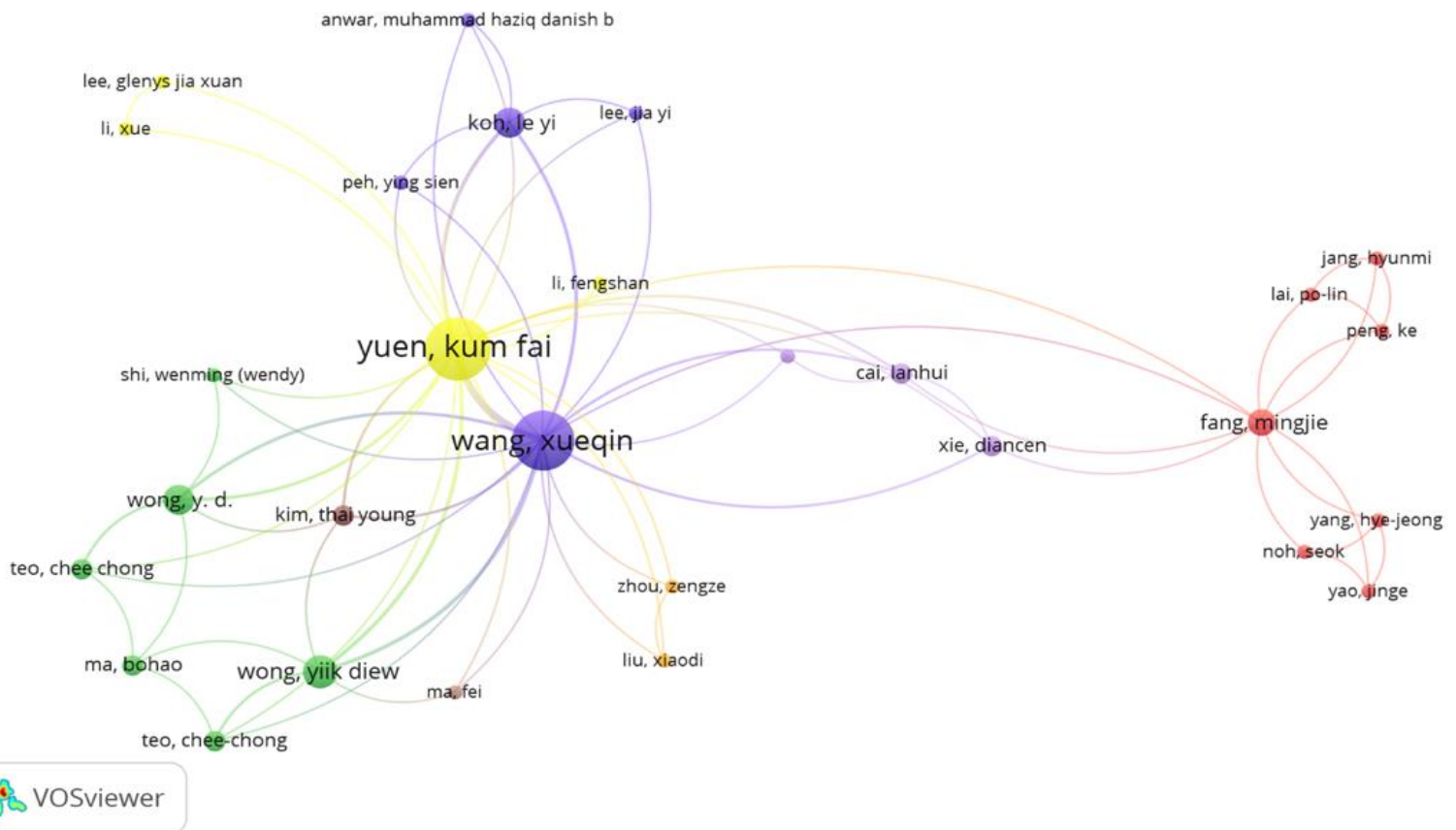


Figure 3: Co-authorship analysis

Citation features indicate how many citations a document has received, as well as the total citations for all published documents. In VOSviewer, a citation link connects two items when one item cites the other. This link is created when a document contains a cited reference that corresponds to one of the keys representing the other paper.

Additionally, citation links are considered undirected, meaning there is no difference between a citation from item X to item Y and one from item Y to item X (Van Eck & Waltman, 2019).

According to the results, the result shows that the most productive authors are independent authors, and only a few groups were identified,

as it shows in (Figure.3), there are only 29 authors connected and grouped into 8 clusters of 69 links, and the total link strength is 104, as shown in the following figure. In this network, Yuen, Kum Fai, and wang, Xueqin are the central researchers in this co-authorship cluster. The co-citation analysis resulted in eight clusters; the color of each node related to the linkage of which each author is linked into a cluster. Cluster one "Red" includes 7 authors, cluster two "Green" includes 6 authors, cluster three "Blue" includes 5 authors, cluster four "Yellow" includes 4 authors, cluster five "Purple" includes 3 authors, cluster six "Orange" includes 2 authors, cluster seven "Dark Brown" includes 1 author, and cluster eight "Light Brown" as well includes 1 author.

3.3.2. Co-occurrence Analysis of Keywords:

This analysis is used to identify the trends in the main topic studied, focuses on the main discipline's field, shows a pattern of a specific context in the past, and helps to reveal any neglected or potential research areas (Souza et al., 2019). In this network, the links related to the co-occurrence of any keyword, and the items refer to the keywords themselves, whereas the lines between two keywords represent their appearance together in one paper. Accordingly, the thickness of that link refers to the number of publications in which these two keywords appeared together; the larger circles represent greater significance (Van Eck & Waltman, 2019). In this research, the co-occurrence network was created for all 235 publications, including both author keywords and indexed keywords.

The minimum number of occurrences used in this research of any keyword was "Three" as a threshold level. The total number of keywords used in this research for all publications was 1455 keywords, of which 172 met the threshold level (62 items, 6 clusters, 499 links, and a total link strength of 852). Therefore, the VOSviewer system transformed the data and categorized the most frequently keywords appeared into six main clusters in the network map visualized in the following figure; all keywords with a similar color belong to the same cluster.



- Cluster One "Red" had 17 items which encompass the primary psychological constructs and behavioral theories those derived from the Theory of Planned Behavior, such as acceptance, adoption, behavioral intention, blockchain, competitiveness, consumption behavior, perceived usefulness, perception, public attitude, structural equation modeling, sustainability, sustainable development, technology acceptance, technology adoption, trust, unmanned vehicle, and user acceptance.
- Cluster Two "Green" had 12 items and focuses on establishing a sustainable tool itself and its impact on its consumers, such as accessibility, consumer behavior, customer satisfaction, emissions, environmental impact, last-mile delivery, location, order fulfillment, parcel locker, pickups, theory of planned behavior, and urban areas.
- Cluster Three "Dark Purple" had 11 items that address the logistical and operational considerations to support some of these research variables, such as attitude, consumer behavior, COVID-19, design, green purchase intention, intention, perceived behavioral control, perceived value, purchase intention, theory of planned behavior, and travel behavior.
- Cluster Four "Yellow" had 8 items which relate to efficiency, delivery points in the urban context, to reinforce the practical benefits of adopting smart lockers in the urban last-mile delivery, such as collection, efficiency, innovation, lockers, perspective, pick-up points, and urban logistics.
- Cluster Five "Light Purple" had 8 items, which highlight the linkage between the smart lockers' adoption and sustainability, such as city logistics, e-commerce, facility location problem, green logistics, logistics, optimization, performance, and routing problem.

- **Cluster Six "Orange"** had 6 items, which highlights the relationship between adopting these smart lockers and some related technologies, such as efficient, internet of things, parcel lockers, planned behavior, self-collection, and smart parcel locker.

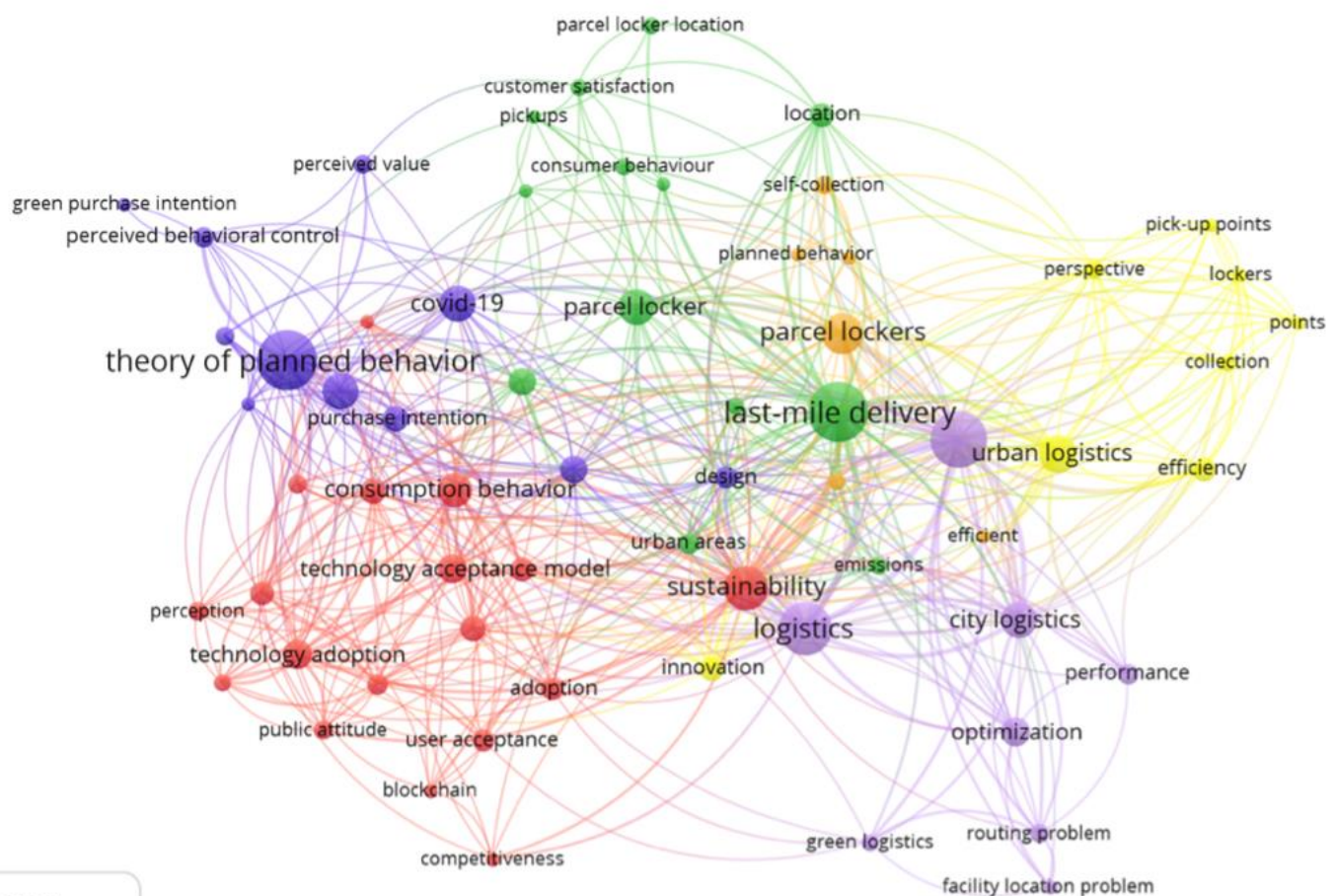


Figure 4: Co-occurrence analysis of keywords

3.4. Qualitative Analysis for the Systematic Literature Review:

Elsafy & Hegazy, (2025) mentioned that the growth of the last mile logistics service in Egypt was contributed to by several factors such as the rise of both local and international e-commerce platforms, which provide Egyptian consumers with unprecedented access to a variety of products, and with the growing middle class in Egypt with increasing their purchase power and their desire for convenient services, its changed the Egyptian demand towards more efficient and reliable



delivery options. The reason behind the witnessed surge in e-commerce adoption in Egypt over the last decade is the increase in youthful and tech-savvy population rates, the internet penetration rates, and the development of mobile applications, which can access online marketplaces easily (NTRA, 2024). Furthermore, it has revolutionized consumer behavior, created a fertile ground for the last-mile delivery services as a main business, and influenced the strategies employed by business owners (Viu-Roig & Alvarez-Palau, 2020).

Even though a noticeable increase in Egyptian e-commerce, e-commerce providers are facing a lot of challenges in delivering their orders to the final consumers efficiently, One of the most important challenges is the inefficiency of the transportation infrastructure in Egypt mainly in the populated urban areas where have poor road conditions, traffic congestion, and limited parking spaces, the second one which is the lack of standardized addressing system as in Egypt many buildings and street are lacking consistent and clear addresses which make it difficult for any logistics provider to locate customers' location accurately and to deliver the required packages on time which will significantly lead to deliveries delays and build up operational cost (Fabre, et al., 2019).

Khaled (2023), mentioned another major challenge facing the last mile logistics service in Egypt, which is the reliance on Cash-on-delivery (COD) as the main payment method for all online purchases, as they consider it a sense of convenience and security, However, from the delivery companies perspective it creates logistical complexities as it enforce them handling large amount of cash, handling reconciliation processes, and to deal with the risk of theft.

Consequently, based on the findings and a robust bibliometric validation of the previous literature systematic analysis using VOS, and according to the keywords, which were clustered, including attitude, perceived behavioral control, convenience, trust, user acceptance, Privacy, behavioral intention, smart lockers, last-mile delivery, and sustainability, as mentioned below in (Table.2). To provide a comprehensive view of the variables affecting customer switching intentions and the relationship between various behavioral and attitudinal factors, the integration between the main constructs from

established behavioral theories, such as the TPB theory and TAM theory, must be tested.

Table 2: Bibliometric validation of the previous literature systematic analysis using VOSviewer

Conceptual Framework Variables	VOSviewer Clusters Number	Key Keywords from Clusters	Type of this Support
Attitude	1, 2, 3	Attitude, attitudinal, acceptance, public attitude, consumer behavior	Direct
Perceived Ease of Use	1	Acceptance, technology acceptance	Direct
Perceived Usefulness	1,2	Customer Satisfaction, perceived usefulness, user acceptance, customer satisfaction	Direct
Perceived Behavioral Control	1, 2, 3, 6	perceived usefulness, perception, theory of planned behavior, consumer behavior, perceived behavioral control, planned behavior	Direct
Convenience	2, 3, 4, 6	Accessibility, location, pickups, travel behavior, collection, pick-up points, points, self-collection	Indirect
Privacy	1, 2	Trust	Indirect
Switching Intention Towards Smart Lockers as a Sustainable Last-Mile Delivery Tool	1, 3, 4, 5, 6	Behavioral intention, sustainability, sustainable development, parcel locker, green purchase intention, purchase intention, efficiency, smart parcel locker	Direct



4. Conclusion and Further Research:

This study, grounded in a bibliometric analysis and systematic literature review, was designed to identify main variables for further conducting a conceptual framework to be applied in Egypt as a case study in investigating customer switching intentions towards sustainable last-mile delivery options using smart lockers.

Most of the existing previous research about adopting new technologies like smart lockers focuses mainly on the intention to use them or to adopt them and needs to focus on investigating consumers' switching intentions and decisions to adopt these smart lockers as an alternative to existing last-mile logistics methods. Therefore, it will require more behavioral outcomes and understanding the main drivers that will create a great change in established habits. Although consumer switching behavior has been examined in other contexts in developing countries, its application to sustainable last-mile delivery in Egypt remains underutilized. In addition, most of the academic research about last-mile delivery challenges in Egypt mainly focuses on difficulties in locating final consumers' addresses, traffic congestion, the prevalence of cash on delivery as a payment method, and Egyptian customers' acceptance of technologies. The perceived trust in technology felt by consumers can be a powerful driver of switching intention. Therefore, the interplay between perceived security, risk, and trust in smart lockers will shape consumer attitudes to switch their intention towards sustainable smart lockers.

This research makes a significant contribution by integrating the behavioral models of TPB and TAM with specific variables, convenience, and privacy, which were identified from the VOSviewer analysis. These research findings provide both theoretical extensions and managerial insights to bridge this research gap between academic theories and real-world applications in developing economies, such as Egypt. The analysis of this research confirms that the adoption of smart lockers is a complex behavioral process that is expected to be influenced by several intentions and perceptions. Therefore, the main core of TAM theory, perceived usefulness and perceived ease of use, will positively influence customers' attitudes. In turn, a positive attitude is expected to

be the most direct indicator of customers' intention to switch to using smart lockers as a sustainable last-mile tool. This study's specific contribution lies in the roles of convenience and privacy factors on the customer's perceived behavioral control as it is argued that both factors of convenience and privacy and particularly in a market with nascent infrastructure such as Egypt. Similarly to the privacy factor, if the providers will be able to demonstrate a robust security measures to enhance user's sense of control, that will build the trust necessary for adoption these lockers even though the privacy concerns exist with the Egyptian customers.

This research provides a theoretical foundation through the synthesis of the existing research rather than on new primary data collected from the targeted population. While this study is well-supported by the literature, empirical validation will be required to confirm the proposed relationships and their applicability to the specific Egyptian market dynamics. Accordingly, the further critical direction for this research is to develop a conceptual framework by integrating the main constructs from established behavioral theories, such as the TPB theory and the TAM theory to test customer switching intention towards sustainable last mile logistics method and to conduct a quantitative empirical study using a large-scale survey of the Egyptian e-commerce consumers to test the proposed hypotheses using statistical methods and to provide comprehensive evidence for the relationship between the variables and their effect on the customer's switching intentions. This would address the study's primary limitation directly and would improve the external validity of the findings.



5. References:

- Adeniran, A., Sidiq, B., Adeniran, A., & Oyeniran, G. (2024). Sustainability Impact of Digital Transformation in E-Commerce Logistics. *International Journal of Innovation in Marketing Elements*, 4, 1–18. <https://doi.org/10.59615/ijime.4.1.1>
- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ajzen, I. (2002). Perceived behavioural control, self-efficacy, locus of control, and the theory of planned behaviour. *Journal of Applied Social Psychology*, 32(4), 665–683. <https://doi.org/10.1111/j.1559-1816.2002.tb00236.x>
- Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & Health*, 26(9), 1113–1127. <https://doi.org/10.1080/08870446.2011.613995>
- Alharbi, A., Cantarelli, C., & Brint, A. (2022). Crowd models for last mile delivery in an emerging economy. *Sustainability (Switzerland)*, 14(3), Article 1401. <https://doi.org/10.3390/su14031401>
- Aras, G., & Crowther, D. (2013). Sustainable practice: The real triple bottom line. In D. Crowther, C. David, & A. Güler (Eds.), *The governance of risk* (Vol. 5, pp. 1–18). Emerald Group Publishing. [https://doi.org/10.1108/S2043-0523\(2013\)0000005004](https://doi.org/10.1108/S2043-0523(2013)0000005004)
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471–499. <https://doi.org/10.1348/014466601164939>
- Arora, P., Srivastava, S., & Majumder, S. (2017). Using Automation Technology and IOT Based Data Capturing to Ensure High Quality Last Mile Logistics. *Proceedings of the 3rd World Conference on Supply Chain Management*.
- Asdecker, B. (2021). Building the E-Commerce Supply Chain of the Future: What Influences Consumer Acceptance of Alternative Places of Delivery on the Last-Mile. *Logistics*, 5(4), Article 90. <https://doi.org/10.3390/logistics5040090>

- Barber, N., Taylor, C., & Strick, S. (2009). Wine consumers' environmental knowledge and attitudes: Influence on willingness to purchase. *International Journal of Wine Research*, 1(1), 59–72. <https://doi.org/10.2147/IJWR.S4649>
- Barlow, P., McKee, M., Basu, S., & Stuckler, D. (2017). The health impact of trade and investment agreements: A quantitative systematic review and network co-citation analysis. *Globalization and Health*, 13(1), Article 5. <https://doi.org/10.1186/s12992-017-0240-x>
- Bastas, A., & Liyanage, K. (2018). Sustainable supply chain quality management: A systematic review. *Journal of Cleaner Production*, 181, 726–744. <https://doi.org/10.1016/j.jclepro.2018.01.258>
- Behnke, M. (2019). Recent trends in last mile delivery: Impacts of fast fulfillment, parcel lockers, electric or autonomous vehicles, and more. In *Logistics management* (Vol. 1, pp. 141–156). Springer International Publishing. <https://doi.org/10.1007/978-3-030-29821-0>
- Bosona, T. (2020). Urban freight last mile logistics: Challenges and opportunities to improve sustainability: A literature review. *Sustainability*, 12(21), Article 8769. <https://doi.org/10.3390/su12218769>
- Cai, Y., & Lo, C. (2020). Omni-channel management in the new retailing era: A systematic review and future research agenda. *International Journal of Production Economics*, 229, Article 107729. <https://doi.org/10.1016/j.ijpe.2020.107729>
- Campisi, T., Russo, A., Basbas, S., Bouhouras, E., & Tesoriere, G. (2023). A literature review of the main factors influencing the e-commerce and last-mile delivery projects during COVID-19 pandemic. *Transportation Research Procedia*, 69, 552–559. <https://doi.org/10.1016/j.trpro.2023.02.207>
- Castaneda, D. I., Manrique, L. F., & Cuellar, S. (2018). Is organizational learning being absorbed by knowledge management? A systematic review. *Journal of Knowledge Management*, 22(2), 299–325.



- Ceccato, R., & Gastaldi, M. (2023). Last mile distribution using cargo bikes: A simulation study in padova. *European Transport - Trasporti Europei*, (90), Article 3. <https://doi.org/10.48295/ET.2023.90.3>
- Chin, J., & Lin, S. (2016). A behavioral model of managerial perspectives regarding technology acceptance in building energy management systems. *Sustainability*, 8(7), Article 641. <https://doi.org/10.3390/su8070641>
- Conner, M., & Norman, P. (2005). Predicting health behaviour: Research and practice with social cognition models. *Safety Science*, 24(1), 24–43. [https://doi.org/10.1016/S0925-7535\(97\)81483-X](https://doi.org/10.1016/S0925-7535(97)81483-X)
- Ducarme, D. (2019). Sustainable solutions for “Last Mile” deliveries in the parcel industry: A qualitative analysis using insights from third party logistics service providers and public mobility experts [Master's thesis, University of Louvain, Belgium].
- Elsafy, A., & Hegazy, S. (2025). Impact of AI on customer experience in E-commerce in Egypt. *International Journal of Business Administration*, 16(1), 16–25. <https://doi.org/10.5430/ijba.v16n1p16>
- Fabre, C., Malauzat, A-L., Sarkis, C., Dhall, T., & Ghorra, J. (2019). E-commerce in MENA: Opportunity beyond the hype. Bain & Company. <https://www.bain.com/insights/ecommerce-in-MENA-opportunity-beyond-the-hype/>
- Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Addison–Wesley.
- Freitag, M., & Kotzab, H. (2020). A concept for a consumer-centered sustainable last mile logistics. In *Lecture notes in logistics* (pp. 196–203). Springer.
- Grewal, D., Gauri, D., Roggeveen, A., & Sethuraman, R. (2021). Strategizing retailing in the new technology era. *Journal of Retailing*, 97(1), 1–11. <https://doi.org/10.1016/j.jretai.2021.02.004>
- Gülpınar, Ö., & Guclu, A. (2013). How to write a review article? *Turkish Journal of Urology*, 39(1), 44–48. <https://doi.org/10.5152/tud.2013.054>
- Haddad, S. (2018) The status of leather supply chain in Egypt: An exploratory study for the INNOLEA project. In *Proceedings of the*

- 7th International Conference on Advanced Materials and Systems (ICAMS), Bucharest, Romania, 18-20 October 2018.
- Haddad, S.S., El-Desouky, Z.I., Ahmed, A.S., Negi, S. (2023) 'The impact of COVID-19 on the pharmaceutical supply chain in Egypt: The case of Pharco Group' in Abdelbary, I., Haddad, S., Elkady, G. Cases on International Business Logistics in the Middle East, IGI Global, pp. 92–109.
- Haddad, S.S., Nasib, N.F. (2023) 'The role of online platforms in enhancing logistics activity performance: Case study - Salla platform: KSA' in Abdelbary, I., Haddad, S., Elkady, G. Cases on International Business Logistics in the Middle East, IGI Global, pp. 186–203.
- Ho, Ching-Wei & Wang, Yu-Bing & Yen, Neil. (2015). Does environmental sustainability play a role in the adoption of smart card technology at universities in Taiwan: An integration of TAM and TRA. Sustainability, 7(8), 10994–11009. <https://doi.org/10.3390/su70810994>
- Hua, Li & Wang, Shanyong. (2019). Antecedents of consumers' intention to purchase energy-efficient appliances: An empirical study based on the technology acceptance model and theory of planned behavior. Sustainability, 11(10), Article 2994.
- Hwang, J., Kim, J. J. & Lee, K.-W. (2021). Investigating consumer innovativeness in the context of drone food delivery services: Its impact on attitude and behavioral intentions. Technological Forecasting & Social Change, 163, Article 120464. <https://doi.org/10.1016/j.techfore.2020.120464>
- Iannaccone, G., & Gatta, V. (2021). What young e-consumers want? Forecasting parcel lockers choice in Rome. Logistics, 5(3), Article 57. <https://doi.org/10.3390/logistics5030057>
- Ignat, B., & Chankov, S. (2020). Do e-commerce customers change their preferred last mile delivery based on its sustainability impact? The International Journal of Logistics Management, 31(3), 521–548. <https://doi.org/10.1108/IJLM-11-2019-0305>
- Jayarathna, C., Agdas, D., & Dawes, L. (2023). Viability of sustainable logistics practices enabling circular economy: A system dynamics approach. Business Strategy and the Environment, 33(5), 3422–3439. <https://doi.org/10.1002/bse.3655>



- Khaled, A. (2023). Factors affecting online services shopping behavior: A study of Egyptian consumers. *Journal of Marketing and Consumer Research*, 54(1), 32–48.
- Lee, S., Park, E., Kwon, S., & del Pobil, A. P. (2015). Antecedents of behavioral intention to use mobile telecommunication services: Effects of corporate social responsibility and technology acceptance. *Sustainability*, 7(8), 11345–11359. <https://doi.org/10.3390/su70811345>
- Liao, H., Tang, M., Luo, L., Li, C., Chiclana, F., & Zeng, X.-J. (2018). A bibliometric analysis and visualization of medical big data research. *Sustainability*, 10(2), Article 166. <https://doi.org/10.3390/su10020166>
- Marcolino, M. S., Oliveira, J. A. Q., D'Agostino, M., Ribeiro, A. L., Alkmim, M. B. M., & Novillo-Ortiz, D. (2018). The impact of mHealth interventions: Systematic review of systematic reviews. *JMIR Mhealth and Uhealth*, 6(1), Article e23. <https://doi.org/10.2196/mhealth.8821>
- Maryati, T. (2020). Consumer behavior changes post pandemic Covid-19. *International Journal of Halal Research*, 2(2), 84–89. <https://doi.org/10.18517/ijhr.2.2.84-89.2020>
- McLeod, F., Cherrett, T., Bates, O., Bektaş, T., Lamas-Fernandez, C., Allen, J., Piotrowska, M., Piecyk, M., & Oakey, A. (2020). Collaborative parcels logistics via the carrier's carrier operating model. *Transportation Research Record: Journal of the Transportation Research Board*, 2674(8), 384–393. <https://doi.org/10.1177/0361198120920636>
- Mitrea, I. A., Zenezini, G., De Marco, A., Ottaviani, F. M., Delmastro, T., & Botta, C. (2020). Estimating e-consumers' attitude towards parcel locker usage. In 2020 IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC) (pp. 1731–1736). IEEE. <https://doi.org/10.1109/COMPSAC48688.2020.000-5>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *BMJ*, 339, Article b2535. <https://doi.org/10.1136/bmj.b2535>

- Mostakim, N., Sarkar, R. R., & Hossain, M. A. (2019). Smart locker: IoT based intelligent locker with password protection and face detection approach. *International Journal of Wireless and Microwave Technologies*, 9(3), 1–10. <https://doi.org/10.5815/ijwmt.2019.03.01>
- Nguyen, A. T. V., McClelland, R., & Thuan, N. H. (2022). Exploring customer experience during channel switching in omnichannel retailing context: A qualitative assessment. *Journal of Retailing and Consumer Services*, 64, Article 102803. <https://doi.org/10.1016/J.JRETCONSER.2021.102803>
- Nguyen, D. H., de Leeuw, S., Dullaert, W., & Foubert, B. P. J. (2019). What is the right delivery option for you? Consumer preferences for delivery attributes in online retailing. *Journal of Business Logistics*, 40(4), 299–321. <https://doi.org/10.1111/jbl.12210>
- Nguyen, H. T. T., Anderson, D. J., Dunne, M. P., & Nguyen, H. T. (2015). Development and validation of a questionnaire to measure health professionals' attitudes toward identification of female victims of domestic violence. *Health*, 7(5), 596–605. <https://doi.org/10.4236/health.2015.75071>
- Niemeijer, R., & Buijs, P. (2023). A greener last mile: Analyzing the carbon emission impact of pickup points in last-mile parcel delivery. *Renewable and Sustainable Energy Reviews*, 186, Article 113630. <https://doi.org/10.1016/j.rser.2023.113630>
- NTRA. (2024). National Telecom Regulatory Authority reports. National Telecom Regulatory Authority.
- Pang, Z., 2018. The Research of Smart Courier Cabinet's Service Quality on Use Intention of Consumers. (Master). Harbin Institute of Technology, Harbin.
- Paul, J., Modi, A., & Patel, J. (2016). Predicting green product consumption using theory of planned behaviour and reasoned action. *Journal of Retailing and Consumer Services*, 29, 123–134. <https://doi.org/10.1016/j.jretconser.2015.11.006>
- Pereira, R. S., Santos, I. C., Oliveira, K. D. S., & Leão, N. C. A. (2019). Meta-analysis as a research tool: A systematic review of bibliometric studies in administration. *Revista de Administração Mackenzie, Human and Social Management*, 20(5), Article 32.



- Pham, D. D. T., Paillé, P., & Halilem, N. (2019). Systematic review on environmental innovativeness: A knowledge-based resource view. *Journal of Cleaner Production*, 211, 1088–1099. <https://doi.org/10.1016/j.jclepro.2018.11.237>
- Qian, X., Chen, S., Liu, K., Li, S., & Li, Y. (2025). Stability analysis of maritime logistics alliance based on blockchain. *Transport Policy*, 163, 219–231. <https://doi.org/10.1016/j.tranpol.2024.12.025>
- Ranjbari, A., Diehl, C., Dalla Chiara, G., & Goodchild, A. (2023). Do parcel lockers reduce delivery times? Evidence from the field. *Transportation Research Part E: Logistics and Transportation Review*, 172, Article 103070. <https://doi.org/10.1016/j.tre.2023.103070>
- Rita, P., & Ramos, R. F. (2022). Global research trends in consumer behavior and sustainability in E-Commerce: A bibliometric analysis of the knowledge structure. *Sustainability*, 14(15), Article 9455. <https://doi.org/10.3390/su14159455>
- Rokicki, T., Bórawski, P., Beldycka-Bórawska, A., Szeberényi, A., & Perkowska, A. (2022). Changes in logistics activities in Poland as a result of the COVID-19 pandemic. *Sustainability*, 14(16), Article 10303. <https://doi.org/10.3390/su141610303>
- Sa-ngiampak, J., Hirankanokkul, C., Sunthornyotin, Y., Mingmongkolmitr, J., Thunprateep, S., Rojsrikul, N., & Prayoonkittikul, T. (2019). LockerSwarm: An IoT-based smart locker system with access sharing. In *2019 IEEE International Smart Cities Conference (ISC2)* (pp. 1–6). IEEE. <https://doi.org/10.1109/ISC246665.2019.9071728>
- Seghezzi, A., Siragusa, C., & Mangiaracina, R. (2022). Parcel lockers vs. home delivery: A model to compare last-mile delivery cost in urban and rural areas. *International Journal of Physical Distribution & Logistics Management*, ahead-of-print. <https://doi.org/10.1108/IJPDLM-03-2020-0072>
- Shah, S. H. H., Lei, S., Ali, M., Doronin, D., & Hussain, S. T. (2019). Prosumption: Bibliometric analysis using HistCite and VOSviewer. *Kybernetes*, 48(6), 1184–1209. <https://doi.org/10.1108/K-08-2018-0402>

- Shang, Y. (2017). Research on smart express box's size proportion optimization and profits distribution based on customer satisfaction [Master's thesis, Zhejiang Sci-Tech University].
- Souza, J. T. D., Francisco, A. C. D., Piekarski, C. M., & Prado, G. F. D. (2019). Data mining and machine learning to promote smart cities: A systematic review from 2000 to 2018. *Sustainability*, 11(4), Article 1056. <https://doi.org/10.3390/su11041056>
- Su, C., Peng, C., Agbodza, E., Bai, H. X., Huang, Y., Karakousis, G. C., Zhang, P. J., & Zhang, Z.-S. (2018). Publication trend, resource utilization, and impact of the US national cancer database: A systematic review. *Medicine*, 97(9), Article e9823. <https://doi.org/10.1097/MD.00000000000009823>
- Sweileh, W. M. (2019). A bibliometric analysis of health-related literature on natural disasters from 1900 to 2017. *Health Research Policy and Systems*, 17(1), Article 37. <https://doi.org/10.1186/s12961-019-0435-0>
- Tang, Y. M., Chau, K. Y., Xu, D., & Liu, X. (2021). Consumer perceptions to support IoT based smart parcel locker logistics in China. *Journal of Retailing and Consumer Services*, 63, Article 102659. <https://doi.org/10.1016/j.jretconser.2021.102659>
- Tommasetti, A., Singer, P., Troisi, O., & Maione, G. (2018). Extended Theory of Planned Behavior (ETPB): Investigating customers' perception of restaurants' sustainability by testing a structural equation model. *Sustainability*, 10(7), Article 2580. <https://doi.org/10.3390/su10072580>
- Tongkachok, K., Elkady, G., & Haddad, S. (2022). Effective role of artificial intelligence and chatbots in marketing strategies for decision making for online customers. *Business, Management and Economics Engineering*, 20(2), 1150–1165. <https://doi.org/10.3846/bmee.2022.18029>
- Tsai, Y. T., & Tiwasing, P. (2021). Customers' intention to adopt smart lockers in last-mile delivery service: A multi-theory perspective. *Journal of Retailing and Consumer Services*, 61, Article 102514. <https://doi.org/10.1016/j.jretconser.2021.102514>
- Tyrväinen, O., & Karjaluo, H. (2022). Online grocery shopping before and during the COVID-19 pandemic: A meta-analytical review.



- Telematics and Informatics, 71, Article 101839. <https://doi.org/10.1016/j.tele.2022.101839>
- Ulmer, M. W., & Streng, S. (2019). Same-day delivery with pickup stations and autonomous vehicles. *Computers & Operations Research*, 108, 1–19. <https://doi.org/10.1016/J.COR.2019.03.017>
- Vakulenko, Y., Hellström, D., & Hjort, K. (2018). What's in the parcel locker? Exploring customer value in e-commerce last mile delivery. *Journal of Business Research*, 88, 421–427. <https://doi.org/10.1016/j.jbusres.2017.11.033>
- Van Eck, N. J., & Waltman, L. (2019). VOSviewer manual: Manual for VOSviewer version 1.6.13. Centre for Science and Technology Studies, Leiden University.
- Viu-Roig, M., & Alvarez-Palau, E. J. (2020). The impact of E-commerce-related last-mile logistics on cities: A systematic literature review. *Sustainability*, 12(16), Article 6492. <https://doi.org/10.3390/su12166492>
- Wahab, S., Ahmed, N., & Samsuddin, S. F. (2025). Parcel locker as a solution for sustainable operations and a contactless self-service solution for last-mile delivery. *Operations and Supply Chain Management: An International Journal*, 18(1), 79–88. <https://doi.org/10.31387/oscm0600456>
- Waltman, Ludo & van Eck, Nees Jan & Noyons, Ed. (2010). A unified approach to mapping and clustering of bibliometric networks. *Journal of Informetrics*. 4. 629-635. 10.1016/j.joi.2010.07.002.
- Wang, X., Wong, Y., Teo, C. C., Yuen, K. F., & Feng, X. (2020). Four facets of self-collection service for e-commerce delivery: Conceptualisation and latent class analysis of user segments. *Electronic Commerce Research and Applications*, 39, Article 100896. <https://doi.org/10.1016/j.elerap.2019.100896>
- Wang, X., Yuen, K. F., Wong, Y., & Teo, C. C. (2018). An innovation diffusion perspective of e-consumers' initial adoption of self-collection service via Automated Parcel Station. *The International Journal of Logistics Management*, 29(1), 164–188. <https://doi.org/10.1108/IJLM-12-2016-0302>
- Yang, H., Luo, Y., Qiu, Y., Zou, J., Masukujjaman, M., & Ibrahim, A. M. (2023). Modeling the enablers of consumers' E-shopping

- behavior: A multi-analytic approach. *Sustainability*, 15(8), Article 6564. <https://doi.org/10.3390/su15086564>
- Yuen, K. F., Wang, X., Ma, F., & Wong, Y. D. (2019). The determinants of customers' intention to use smart lockers for last-mile deliveries. *Journal of Retailing and Consumer Services*, 49, 316–326. <https://doi.org/10.1016/j.jretconser.2019.03.022>
- Yuen, K. F., Wang, X., Ng, L. T. W., & Wong, Y. D. (2018). An investigation of customers' intention to use self-collection services for last-mile delivery. *Transport Policy*, 66, 1–8. <https://doi.org/10.1016/j.tranpol.2018.03.001>
- Yuriev, A., Dahmen, M., Paille, P., Boiral, O., & Guillaumie, L. (2020). Pro-environmental behaviors through the lens of the theory of planned behavior: A scoping review. *Resources, Conservation and Recycling*, 155, Article 104660. <https://doi.org/10.1016/j.resconrec.2019.104660>
- Zhou, M., Zhao, L., Kong, N., Campy, K. S., Xu, G., Zhu, G., & Wang, S. (2020). Understanding consumers' behavior to adopt self-service parcel services for last-mile delivery. *Journal of Retailing and Consumer Services*, 52, Article 101911. <https://doi.org/10.1016/j.jretconser.2019.101911>