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INCORPORATING TECHNICAL AND BUSINESS PERSPECTIVES OF LOGISTICS IN THE E-COMMERCE ENVIRONMENT:

Systematic literature review, current tendencies, and avenues of inquiry

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Abstract:
Among the most prominent issues currently facing E-commerce service optimization and study is comprehension of how to effectively implement different logistics optimization approaches and paradigms under a coherent framework, connecting them to the company's business functions and objectives. The current empirical E-commerce-related logistics literature contains knowledge gaps regarding the business process and technical aspects of E-commerce business models. Therefore, this study systematically reviews extant empirical studies regarding ways in which E-commerce logistics processes could be more efficiently managed in organizations by integrating technical and business perspectives. One of the gaps identified, is the empirical testing of a consistent business strategy regarding the E-commerce business model incorporating the view of customer-perceived performance concerning the E-commerce logistics architecture. Because of the analysis and processing of the findings, this study offers a perspective of the status of the literature in the field as well as providing a view of the main dimensions in optimizing a logistics system in an E-commerce environment. Statistical analyses regarding the main countries of origin, institutional affiliations and thematic distribution of the studies selected in the sample used in this article were performed. This article contributes to the E-commerce logistics body of knowledge by covering the trends the current literature regarding the most prolific topics, countries of origin and publications as well as identifying knowledge gaps and thereby offering actionable insights into E-commerce business practice and logistics optimization. Thereby, this study is guiding managers' approach to managing E-commerce logistics optimization projects by underscoring the need for a holistic approach that incorporates all approaches in a structured manner by viewing the technological and business dimensions as interconnected. Lastly, promising future research opportunities are identified to move the E-commerce logistics research forward.

Keywords: e-commerce; logistics; optimization; technology, systems.

INTRODUCTION

The business environment in the field of e-commerce characterized by the global scale and the need for a reaction speed of the logistics system, much higher than those existing in the past, made the supply system to be in a continuous metamorphosis in the attempt to adapt to market requirements. Moreover, he emergence of new technologies as well as various events causing economic pressure on society increased need to integrate both customers and business partners and suppliers in the supply chain which contributes even more to the increase in the complexity of the modern logistics system. However, the logistical systems underpinning this novel industry have recently been subjected to extreme pressures, stemming from extraneous events with world-wide impact such as the COVID-19 pandemic (1). Although there is a growing body of literature investigating this phenomenon, the studies focusing on the logistics systems

supporting the E-commerce industry are either exploring them from a technical point of view (2), a purely commercial one (3) or from the perspective of individual case studies (1). This eludes the insights produced by the synergies provided by a holistic approach, integrating both business and technical perspectives. Furthermore, the preponderence of innovative technologies meant at increasing efficiency clashes with the current needs of the supply chain, such as increase resiliency, laid bare by such events as the COVID-19 pandemic (1).

This work represents a systematic literature mapping study that addresses both the way the traditional logistics system and the modern one work in the context of e-commerce. However, most of the existing studies approach the subject of e-commerce logistics either by treating purely logistical components or by treating technological issues at a very general level, without touching the connection points between the two. When these connection points between the company's external logistics systems and its internal software are addressed, their treatment is carried out at a very high and hypothetical level, thus abstracting the concrete issues, such as, for example, making the software connection between the company's systems and those of business partners and suppliers. Therefore, the present study represents an investigation of the specialized literature to identify works addressing concrete techniques and ways of making the software connection between the company's systems and third-party systems. This study revealed that the way to optimize the current software processes in combination with the current business and logistics processes of e-commerce companies is largely still unclear in the specialized literature and therefore requires more research in the future. The article has the following structure. After presenting the topic and the gaps found in the literature, the research protocol utilized in the systematic literature review process is described in detail. Next, the results are listed, followed by the analysis and discussion. The article ends with conclusions and recommendations for future research.

1. EXPERIMENTAL METHOD

The research consisted of a systematic literature review, gathering and assessing all the data extracted from primary studies (3). The purpose of the review is to detect gaps in the current scientific knowledge in the field, offer pratical insights, and guide future research, while amassing all the information into a coherent synthesis (3). The Systematic Reviews and Meta-Analyses Protocol (PRISMA)(4) was used (Figure 1). It offers a transparent structure for presenting systematic review results. The results were obtained through the following processual stages: First stage – definition of the research question: what are the main trends affecting research related to the software logistical systems used in e-commerce? Second stage – definition of the research objective of the literature review: to identify the current literature concerning software logistical systems employed in e-commerce published in the last 5 years, including all types of documents such as articles, reviews, conference papers, and book chapters, among others, in the English language regardless of the country of origin. Third stage – definition of primary data sources: The scientific database utilized was Scopus. It was chosen due to its high level of scientific and multidisciplinary sources and advanced search functionalities. Fourth stage – definition of keywords. First, the keywords from the research question were identified through a preliminary understanding of the logistics software systems literature. Then, the keywords were used during the search process to check for occurrences in articles in order to answer the research question. All the keywords used in the search were: (TITLE-ABS-KEY(logistics) AND TITLE-ABS-KEY(e-commerce) AND TITLE-ABS-KEY(software))AND (LIMIT-TO (PUBYEAR,2022) OR LIMIT-TO (PUBYEAR,2021) OR LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018)) AND (LIMIT-TO (SUBJAREA,"COMP") OR LIMIT-TO (SUBJAREA,"ENGI") OR LIMIT-TO (SUBJAREA,"BUSI")) AND (LIMIT-TO (LANGUAGE,"English").Fifth stage – definition of the time interval of the search: The time i interval covered by the search process was limited to the last 5 years (starting in 2018). This was due to the relatively high number of results obtained in the preliminary exploration of the literature. This approach led to a distribution of results including the period of the COVID-19 pandemic and the challenges imposed by it on the logistical chains, which were reflected in the body of literature. Sixth stage – Definition of criteria for inclusion and exclusion of studies: The following inclusion criteria were considered: (i) scientific papers studying the employment of software applications for solving companies' specific logistics challenges at strategic, tactical or operational levels (ii) scientific articles approaching the optimization of logistics processes from an improvement perspective (e.g. best practices, lessons learned from previous projects and industry guidelines); (iii) articles in the English language; (iv) articles approaching the subject of cloud-based, or on premises logistics software systems belonging to the fields of business and management and (v) peer-reviewed studies. This was an inclusion criterion considered for all previous criteria. The exclusion criteria applied were as follows: (i) articles approaching the topic of logistics software systems from a purely quantitative (e.g. analytical, model-based, operational research) perspective, making it challenging to attain qualitative insights; (ii) grey literature; (iii) articles approaching the implementation of logistics software applications of an

excessively general or purely theoretical nature, devoid of empirical application; (iv) articles that did not directly support the answering of the research question, as well as those that did not offer models or guidelines regarding logistics software platforms; and (v) duplicate articles and those that did not address the specific problem statement of the present research. Seventh stage – screening: The first layer of analysis consisted of examining the paper's title and abstract to verify if their content directly addressed logistics software application methodologies. A number of 6 papers were excluded at this step. Next, an in-depth analysis of all the sections of the potential papers was performed to identify if the articles proposed original approaches or models. Then, the models and approaches identified in the articles were examined to separate those with practical applications in logistics software field. At this stage, the models were grouped and screened for duplicated approaches. This resulted in a set of directly applicable methodologies related specifically to logistics software applications and management available for further analysis. The resulting articles were manually scanned through by reading the title and abstract, then critically validated by the researchers after discussions. A total of 27 articles were obtained after the eligibility analyses. (3) argue that an adequate literature analysis must necessarily include various approaches to finding relevant papers, and a thorough selection process is a standard practice in literature review research. Eighth stage – methods and tools: A comprehensive spreadsheet was utilized to consolidate the relevant information extracted from the papers. The key information examined according to the spreadsheet included the paper's objective and research question, methodology, demographics aspects, research context and business segment, main contributions, limitations, and opportunities for future research aligned with our paper objective. The method used was aimed at increasing the assimilation of information and refining the search. Ninth stage – registering of review: The PRISMA checklist protocol was utilized for registering the literature review (Appendix A), ensuring reliability and transparency.

1. RESULTS

Descriptive analysis

Additional aspects of the data were revealed from itterative analyses and categorizations of the studies from different angles.

2.1 Distribution of published studies per journal

Figure 1 lists the journals in which the selected studies appeared. The publication source with the most published articles is IEEE with 8 studies representing 30% of the sample consisting of 27 articles. The second most prolific publication avenue is ACM International Conference with 2 articles representing 7% of the sample used in this article. All the other publication sources of the studies used in this article espoused only one article each amounting to 4% of the total sample for each publishing avenue.

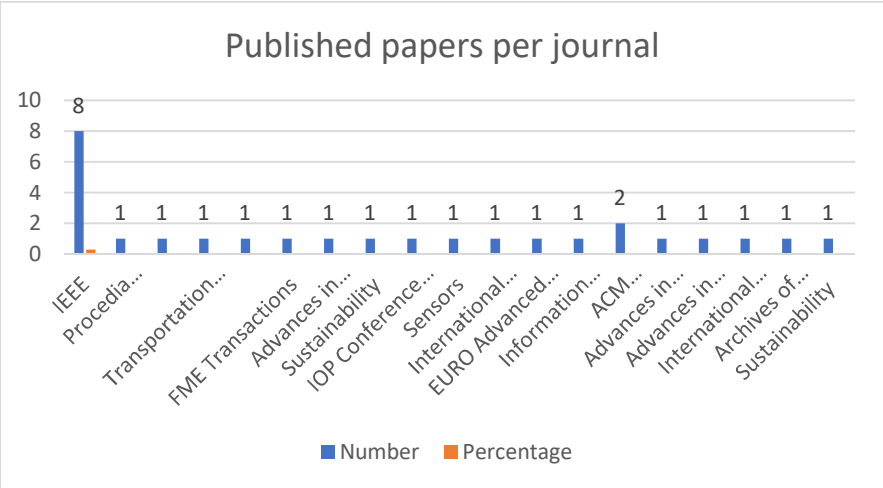

Figure 1. Published papers per journal

It is noteworthy that even though IEEE is the leading publication source according to the numbers of studies published, these have been bublished under individual conferences, each espousing 1 article, amounting to 4% of the ssample used in this article.

2.2 Distribution of studies per country

The mapping of the countries of origin of the studies used in the present article is shown in the diagram below. Figure 3 reveals that China leads with 12 published articles amounting to 44% of the studies used in the selected sample, while Poland ranks second with 3 studies. They are followed by United States, India and Indonesia, each originating 2 papers amounting to 7% of the selected sample. The remaining countries originating one paper each are: Belgium, Greece, Italy, Colombia, Morocco and Sri Lanka. The assignment of a specific country of origin to an article has been done using the first author's institution of affiliation.

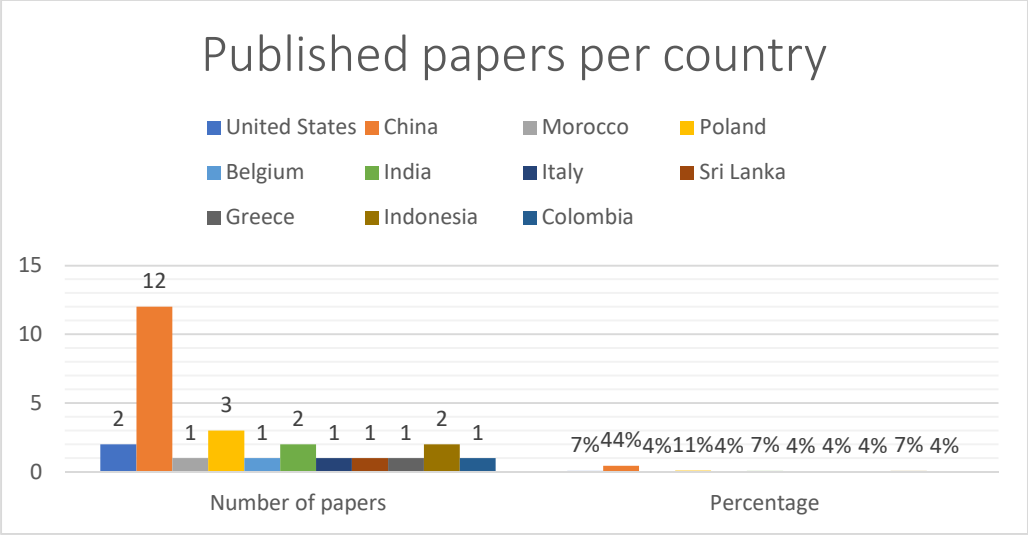

Figure 2. Published papers per country

2.3 Chronological distribution of studies

The above analysis revealed an abundance of articles focused on investigating the logistics systems of e-commerce companies in the chosen chronological range (2018-2022). However, a statistical analysis showed that the number of articles is not constant over the years (fig. 3):

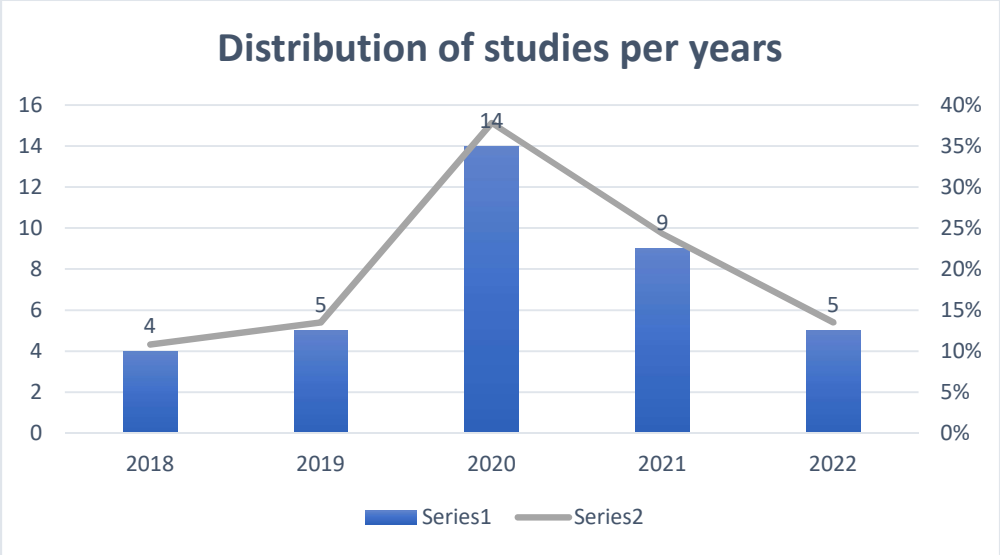

Figure 3. Distribution of studies per years

From the diagram above, it can be seen that the number of articles dealing with the subject of e-commerce logistics is characterized by a moderate increase between 2018 and 2019 (11% and 14%). Also, the statistical analysis of the sample of articles selected for this work shows that this number of articles dealing with the topic of logistics in the e-commerce regime undergoes a dramatic increase in 2020 (38%) when the number of articles dedicated to this topic triples compared to 2018 Although this percentage decreases in 2021 to 24%, this number still represents a doubling of the articles published in 2018. The diagram indicates a return to the percentage of 14% from 2019 in 2022.

Although these variations can have multiple causes, a correlation with the timeline of the COVID-19 pandemic and its documented effect on the e-commerce industry (1) can be assumed. Furthermore, (1) considers the effects of the COVID-19 pandemic as one of the main recent influences on the research related to logistics.

Moreover, as previously mentioned, a grouping of articles around general themes can be observed. Thus, a statistical analysis of this phenomenon in the sample of analyzed articles revealed the following groupings (fig. 4):

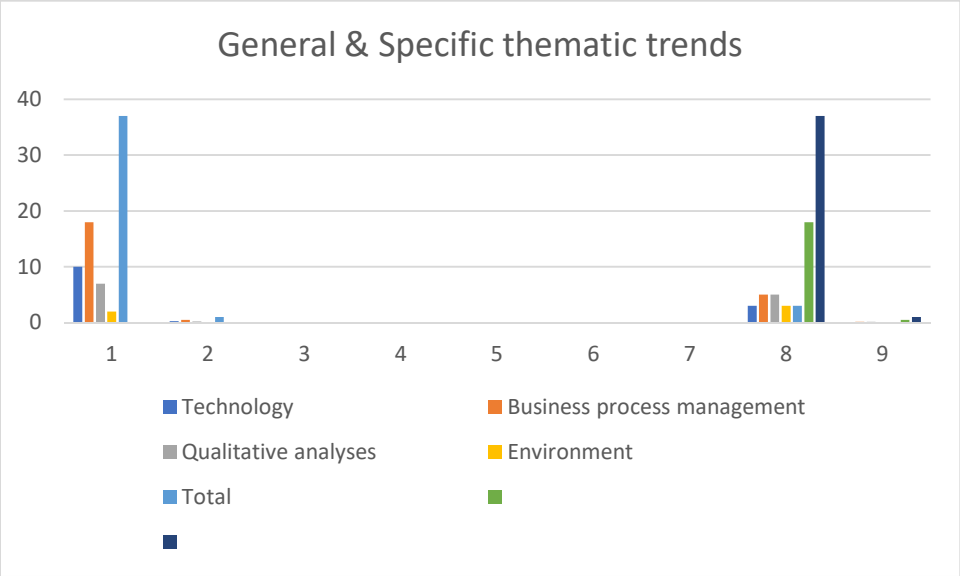

Figure 4. General and specific thematic trends

It can be seen that the predominant general theme treated is that of approaching the e-commerce logistics system from the point of view of managing its related business processes (50% of the articles). This is followed by the applied technologies in thee-commerce supply chain approach (30% of items). The problem of the quality of the service offered is treated by 19% of the articles, followed by environmental issues in the e-commerce logistics context (5% of the articles). This thematic segmentation reveals that, first of all, the economic importance of the e-commerce industry subordinates the other issues of a technological, qualitative nature, etc., in the existing literature. The very low presence of environmental problems related to e-commerce logistics in the selected literature is surprising. This can be seen not so much as due to the lack of importance of the environmental perspective, but as an effect of the prominence of environmental issues in logistics in general, this topic being exhaustively addressed in other contexts.

It can also be observed that from the point of view of the objectives pursued, the selected articles can also be grouped according to certain particular themes. Thus, with a score of 14% in both cases, objectives related to the optimization of storage processes and planning of distribution vehicle routes dominate the analyzed articles. Also, the exploration of ways to reduce logistics costs through the joint use of the resources of various actors is another recurrent objective (8% of the articles). With an identical percentage of 8% of the articles, both the exploration of logistics optimization methods related to perishable products in the e-commerce context and the development of methodologies for analyzing the customer opinion of e-commerce companies are objectives found in several articles from the selected sample .

It is considered that these trends are both an indicator of the importance of the traditional functions of logistics (storage and transport) and of the evolution of some elements that exert a higher influence considering the context of e-commerce than in traditional logistics (e.g. the importance of the quality of customer service and the transport of perishable products, traditionally reserved for offline stores).

DISCUSSION

The study revealed that the field has progressed in such areas as optimization of ressource use and service improvement from a customer - centric perspective. While the perspetcives on the former vary from either use of technological means to improve traditional logistical processes (5; 6; 7) to improvements resulted from new ways of using resources (8; 9), the latter follows the same trend of resorting to technology to gauge customer feelings (10) or or seeking insights bty analyzing these feelings in extraordinary circumstances(1)

Although numerous studies have been identified in the current body of literature, their analysis has reveled disparate approahes to the subject matter which failed to offer an overall coherent structure for their practical implementation. This structure is essential to the efficient dissemination of information and interaction between industry and research necessary for consistent progress in any field.

As a whole, various types of knowledge gaps in the literature were revealed, suggesting the necessity of further research. First, we showed that literature is more focused on describing models and conceptual tools than on testing them in the real-world (11;12:13:14:15:16). Second, only a relatively small percentage of studies approach the correlational relationships between the customer-centric indicators of service quality indicators of e-commerce platforms and the quality of its logistical architecture (13;17). Third, despite the relative abundance of case studies, it was not possible to identify a specific integrative framework for the application of multiple approaches to active systems in the market.

Fourth, although numerous articles approached the topic of logistics operations optimization from an information-based perspective (18;19;20;21;22; 23; 24;25; 26;27;28;29), they mostly do so by focusing on a specific element of the supply chain thus limiting the resulting improvements to that particular area. Despite this, a very small number of articles also took a holistics approach encompasing the supply chain as a whole (30;31).

The study's main limitation was the limited access to relevant literature data, primarily because most such documents regarding companies' actual logistical tructures are not publicly available. Moreover, many publications found did not exhibit the necessary level of detail to offer a deep -enough insight into the topic.

The potentials and limitations of conceptual models regarding E-commerce logistics represent another avenue for research that requires more attention.

CONCLUSION

The systematic literature research revealed the fact that there is a lack of studies on the management of the integration process of e-commerce platforms with third-party logistics systems along the supply chain

However, most studies approach the subject of e-commerce logistics either by treating purely logistical components, or by treating software elements at a very general level (without touching the points of connection with logistics systems) or by treating adjacent topics such as the effects on environment, correlation with marketing efforts, etc.. Moreover, most of the studied articles focus on improving the business processes of e-commerce companies by proposing innovative software solutions to be applied in the future in combination with new business processes of e-commerce companies. The technical and software problems encountered by e-commerce companies in their day-to-day processes are not found in the studied literature. The author therefore considers the need for future research based on a perspective focused on the optimization of current software processes in combination with the current business and logistics processes of e-commerce companies.

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