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# Ten Years of SME E-Commerce Performance Factors and Metrics, 2011-2021

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## ABSTRACT

Small and medium enterprises (SMEs) generate 90% of employment and contribute more than 50% to the world product, where e-commerce (EC) is fundamental to their development. In this study, a systematic review of literature from indexed journals in Scopus and Web of Science is conducted, 73 primary studies are identified to answer the inquiry: What affects EC performance and how is it measured? Twenty-eight definitions for EC, 70 ways of understanding performance in three perspectives (financial, customer-market, and process), 51 metrics to measure them, and 74 factors that affect these were identified. However, there is a lack of studies on performance factors from its process as well as the metrics that contemplate other perspectives, such as technological innovation, social responsibility, and value co-creation. Additionally, studies on factors are oriented to the result but not to the process that generates said result, which means there is a gap to be studied.

## KEYWORDS

e-Commerce, Performance, SME, Small and Medium Enterprises, Metrics, Factors

## INTRODUCTION

Small and Medium Enterprises (SMEs) generate around 90% of employment worldwide (Ayyagari et al., 2017) and contribute more than 50% to the world gross domestic product. However, due to government changes and global financial and sanitary crises, SMEs need to be more competitive. Technologies in information and communication (TIC) provide a path for this (Mauricio, 2001), which additionally with good management, can make SMEs resilient (Sullivan-Taylor & Branicki, 2011), or better yet, antifragile. In other words, to be able to benefit from crises by reacting quickly to the volatility and the uncertainty in which they operate (Taleb, 2012). In that path, commercial activities through TIC, known as e-commerce (EC) (Chaffey & Ellis-Chadwick, 2016) are necessary.

EC is vital for SMEs with significant transaction volumes, hitting \$4.2 billion in 2020 and \$4.9 billion in 2021 (eMarketer, 2021). Recognizing EC's profitability (PEC) is key, as studies suggest it

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stems from financial gains (Ghandour, 2015), reaching new markets, cost-cutting (Mbatha, 2013), and enhancing customer satisfaction and growth (Di Fatta et al., 2018). However, these views on PEC are varied and incomplete. Accurate PEC measurement, incorporating factors like cost management (Chong et al., 2011), sales growth (Pett & Wolff, 2011), and customer contentment (Li et al., 2015), is essential. Moreover, PEC is shaped by factors such as the shopping experience (Svatosova, 2020) and claims management (Izogo & Jayawardhena, 2018), highlighting the need for a comprehensive factor inventory to guide PEC enhancement strategies.

There are various studies on review of literature about EC; for example: the study of Lim, Jin and Srai (2018) that reviews last mile logistic models in the context of supply chain and EC, and the study of Fang and Fang (2022) that analyzes keyword sets of articles to understand the trends of EC publications in China. However, PEC studies have only been identified in journals indexed in Scopus and Web of Science (WoS). Hua (2016), who reviews 155 articles in hospitality and tourism during the 2010-2015 period from a benefit approach regarding EC efficiency, finds that EC is influenced by the environment of the market and organization, and the dynamic and interactive relationship between them; thereby, proposing a framework for a better understanding but not showing the factors that influence profitability nor the metrics to measure these factors. Moreover, there is a great quantity of factors that affect PEC and a variety of metrics to measure them, for which it is necessary to make a systematic review of literature to answer the question, which is this study's objective: How is PEC measured and which factors affect it?

The main contributions of this article are the following:

- To provide an overall vision of EC profitability in SMEs, specifically in aspects such as concept, factors that affect it, and metrics to measure these factors.
- To provide a definition for EC and its profitability that integrates the previous concepts and is useful to new technological contexts.
- To provide readers with a wide array of bibliographical references that can be used to understand and research EC profitability in SMEs in more detail.

This article is organized into five sections. Section 2 outlines the research methodology used to develop the state of the art. Section 3 presents the statistics and the answers to the research questions. The discussion is presented in Section 4. Finally, conclusions and challenges are discussed in Section 5.

## **METHODOLOGY**

The methodology to make a systematic review of literature (SRL) is based on three very common phases in SRLs about factors; for example: in productivity, Castañeda and Mauricio (2018); in female entrepreneurship, Cabrera and Mauricio (2017); and in startup success, Santisteban and Mauricio (2017). The methodology is divided into: Planning, where the research questions and the protocol for article selection are proposed; Development, where the protocol is applied; and Results, where the results (Section 2.3) are exposed, and the research question is answered (Section 3).

### **Planning**

To answer the research question, the following questions are posed:

Q1: How is EC conceptualized in the environment of SMEs?

Q2: What is PEC in SMEs?

Q3: Which metrics are used to measure PEC in SMEs?

Q4: Which factors affect PEC in SMEs?

**Table 1. Criteria for inclusion and exclusion**

Criterion Type	Concept	Reason
Inclusion	Topics	Business, Management, Computer Science Information Systems, Computer Science, Software Engineering, Operations Research Management Science, Computer Science Theory Methods, Computer Science Interdisciplinary Applications, Computer Science Artificial Intelligence
	Quantitative information	Articles are included because they contain research results as evidence, which represents the main interest of this review,
	Only EC adoption in SMEs	Presents a direct link to EC profitability in SMEs.
	Language	English
	Period	January 2011-July 2021
	Document type	Journal articles
	Article type	Primary
Exclusion	Theoretical without support	Proposals do not present theoretical nor experimental support.
	Subjects not associated with measuring EC profitability in SMEs	Does not answer research questions.
	Only EC adoption in SMEs	Does not present a direct link to EC profitability in SMEs.

These inquiries will be answered based on a review of articles from journals in Scopus and WoS from the January 2011-July 2021 period. For this reason, a “title-abs-key” search in Scopus and a “topic” search in WoS will be conducted considering the following chain:

(ecommerce OR e-commerce OR m-commerce OR mcommerce OR “mobile commerce” OR “electronic commerce” OR marketplace OR emarketplace OR “digital platform”) AND (“conversion rate” OR CRO OR “conversion rate optimization” OR optimization OR performance OR sales OR marketing OR analytics OR “predictable analytics” OR predictive OR metrics OR “growth sales” OR CSF) AND (SMB OR SME OR “small and medium business” OR “small and medium enterprise” OR “small Business” OR “small enterprises”)

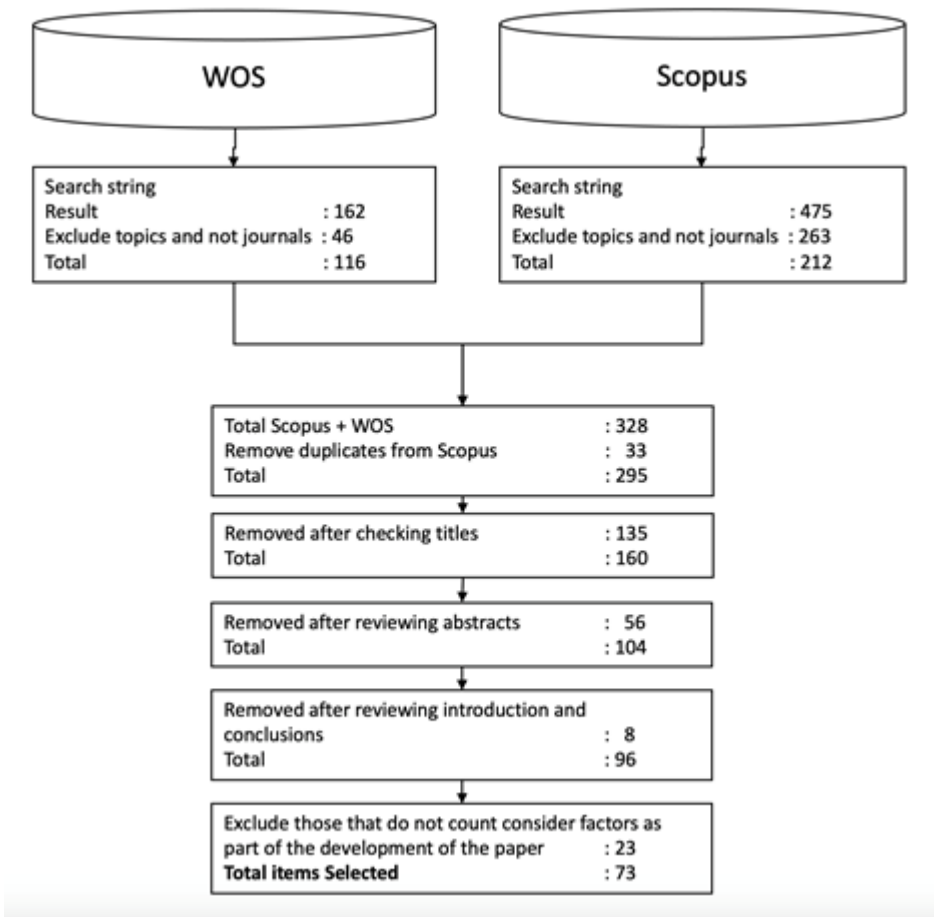
A review prioritized high-quartile journals (Q1, Q2) from Scimago (2021) for their scientific rigor, ensuring the reliability of our systematic review.

The review was limited to journal articles because these are considered reliable sources and represent authorized statements on the subject (Ardito et al., 2015); thereby, excluding books, book chapters, and conference proceedings. This criterion and others are shown in Table 1.

## Development of Review

A total of 637 studies were identified for review: 162 from WoS and 475 from Scopus that, after applying inclusion and exclusion criteria as well as common articles, were reduced to 116 and 212, respectively. Subsequently, titles and summaries were reviewed, eliminating 135 articles due to titles and 56 articles due to summaries, with only 104 articles remaining. Then, introductions and conclusions were reviewed, obtaining 96 documents. Finally, the whole content of each article was read to determine its relevancy for this study, finding 23 studies that do not answer the research questions with a total of 73 selected primary studies remaining (see Figure 1), which are shown in Annex 1.

Figure 1. Literature review process



## Results

Figure 2 shows the following results: from 23 countries that present publications, 11 of these represent 81% of the publications, where China is in the lead with 14 articles, the United Kingdom with 11, and Malaysia with eight. Furthermore, of the 73 selected articles analyzed, they span 66 different journals. Notably, 71% of these articles (amounting to 52) are published in journals ranked in the top quartiles, Q1 and Q2, as delineated in Figure 3 (Scimago Journal & Country Rank, 2021). This distribution underscores the robustness of the research findings, reflecting a reliance on sources from well-regarded scientific journals.

## ANALYSIS

During the decade from 2011 to 2021, a significant evolution in the key metrics and factors in studies on e-commerce and SMEs is observed, as reflected through the contributions of various authors (See Table 2).

This evolution, driven by the contributions of these academics, highlights not only the growth and maturation of SMEs in the digital space but also a constant adaptation to the changing dynamics of the market and technology.

Figure 2. Results of publications

First Author Affiliation	Articles	% of Total	Cumulate sum
China	14	19%	19%
United Kingdom	11	15%	34%
Malaysia	8	11%	45%
United States	6	8%	53%
Indonesia	5	7%	60%
United Arab Emirates	3	4%	64%
Turkey	3	4%	68%
Australia	3	4%	73%
Spain	3	4%	77%
Sweden	2	3%	79%
Italy	2	3%	82%
South Africa	2	3%	85%
Others (an article by country)	11	15%	100%

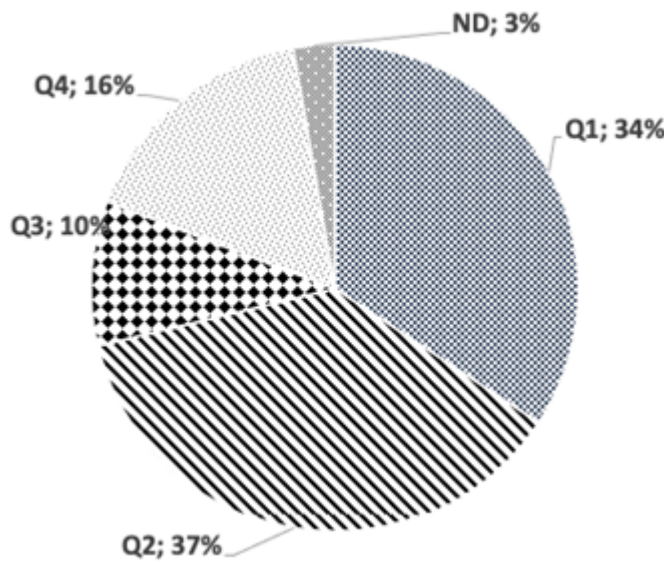
In this section, answers are given to the research questions formulated during planning.

### How is EC Conceptualized in the Environment of SMEs?

In the context of small and medium-sized enterprises (SMEs), the conceptualization of electronic commerce (EC) encompasses five pivotal components:

1. Digital Environment: This entails interconnected networks, such as the Internet and electronic devices (Ramanathan et al., 2012; Mbatha, 2013; Meiryani et al., 2020; Chen & Zhang, 2013).
2. Transactions: Referring to the operation of exchanging value, whether it involves purchases, sales, rentals, rights grants, or other commercial activities (Alawi et al., 2018; Saridakis et al., 2018; Shemi & Procter, 2018).
3. Goods and Services: Denoting the commodities or services being exchanged for value (Hashim & Abdullah, 2014; Changchit & Klaus, 2015; Herzallah & Mukhtar, 2016).

Figure 3. Quartiles



**Table 2. Evolution of academic focus on SMEs' electronic commerce**

Year	Focus	Authors
2011	Operational efficiency, supply chain, and cost reduction	(Chong et. al, 2011)
2012	Communication and customer satisfaction	(Cosgun & Dogerlioglu, 2012)
2013	Inclusion of emerging technologies and	(Thompson & Williams, 2013)
2014	Innovative market strategies	(Hashim & Abdullah, 2014)
2015	Data analytics and customer personalization	(Changchit & Klaus, 2015),
2016	Sustainability and corporate social responsibility	(Lakhanpal & Khan, 2016)
2017	Adaptability	(Lukac & Sabol, 2017) (Scuotto & Caputo, 2018) (Hånell & Rovira Nordman, 2019)
2020	Adapting to the changing market and technological dynamic	(Meiryani & Sudrajat, 2020) (Purba & Simanjutak, 2021)

4. Business Activities: Encompassing supplementary endeavors like publicity, marketing, distribution, logistics, business processes, and production (Ramanathan et al., 2012).
5. Context: Pertaining to either intra-organizational or inter-organizational aspects (Hashim & Abdullah, 2014).

From these components, the subsequent definition of EC emerges:

*Electronic commerce constitutes commercial transactions involving the purchase, sale, and transfer, whether physical or digital, of valuable assets. These transactions are accompanied by various business activities, both within and between organizations, facilitated through electronic devices across interconnected networks.*

### **What is PEC in SMEs?**

A definition for PEC has not been found; however, the authors understand profitability in several ways, such as return growth, cost reduction, resource productivity, among others (see Annex 2). On the other hand, the term “performance” is described as the result of business activities (Kotane & Kuzmina-Merlino, 2017) and the efficiency of resources used to achieve the product (Castañeda-Vargas & Mauricio, 2018), which relate the result and the process; therefore, it can be defined independent of the perspective (e.g., financial) that the organization prioritizes:

*PEC is the results of EC regarding everything involving its launch and operation.*

### **Which Metrics are Used to Measure PEC in SMEs?**

Fifty-one metrics have been identified and classified considering the business perspectives: financial (see Table 3), customer-market (see Table 4) and business process (see Table 5), from Kaplan and Norton (2008), widely used to date.

### **Which Factors Affect PEC in SMEs?**

Aguilar (1967) sustains that the Political, Economic, Social, Technical, and Legal (PESTL) categories are the most important to understand the context in which a business performs. Porter (1998) recognizes four categories of factors influencing the dynamics of the industry in which the business

is involved: Industry growth rate, Technology and innovation, Government, and Complementary products and services. However, it is not possible to explain all factors that affect EC in a SME with Porter and Aguilar's categories since, for instance, they do not include factors that directly affect the organization. Sebor, Lee and Sukasame (2009) classifies critical success factors for EC into founding factors (including achievement orientation, tendency to take risks, locus of control, and electronic networks), electronic service factors (including reliability, responsiveness, ease of use, and self-service), and government. Cosgun (2012) postulates 10 factors that influence EC grouped in three factor categories based on the TOE (Technological, Organizational, and Environmental) framework from Tornatzky and Fleischer (1990).

TOE describes how the company's environment influences the adoption and implementation of innovation, which has been extended by Cosgun (2012) to categorize the factors that influence EC profitability, covering external factors proposed by Aguilar (1967) and Porter (1998) as well as Sebor, Lee, and Sukasame (2009), the "government" category. On the other hand, the "Founder" and "e-service" categories are included in the dimensions of organization and technology, respectively. Consequently, this study considers the TOE categorization to which the "Consumer" dimension is added, which refers to the influence this dimension has on EC profitability; this dimension is important because it allows the understanding of EC profitability from a consumer perspective (reason for EC). For example, the value of the consumer's experience that directly affects profitability, which entails that the better the experience, the higher the profitability, and that cannot be classified as technological despite its relation to technology, is an issue of perception, sentiment, and valuation. Moreover, it cannot be classified as organizational because the consumer is not part of the organization nor can it be classified as environmental since, in the case of TOE, this category is oriented to issues of regulation, providers, and competition. The new categorization is called TOEC (see Table 6).

Below are the categorized factors that influence profitability, according to TOEC, in which: ++ indicates those that have an experimentally proven positive impact; --, those that have an experimentally proven negative impact.

### **Technological Factors (TF)**

A total of 34 studies helps explain 18 technological factors (see Table 7), many explaining more than one factor, among which the most studied factors are technological competence with 21 studies (62%), and content-experience and safety-trust with seven studies each (21%).

### **Organizational Factors (OF)**

Thirty-two organizational factors have been identified and explained in a total of 57 studies (see Table 8), among which the most frequently referenced are customer management services with 15 (26%), innovation with 13 (23%), owner and internal stakeholders with 12 (21%), and, finally, strategic planning with 11 (19%).

### **Environmental Factors (EF)**

A total of 22 studies helps explain 14 environmental factors (see Table 9), many explaining more than one factor, among which the most studied factors are industry pressure with 15 studies (68%) and level of governmental support with eight (36%).

### **Consumer Factors (CF)**

A total of 12 studies helps explain nine consumer factors (see Table 10), many explaining more than one factor, among which the factor that stands out is perceived utility with five studies (42%).



Table 3. Metrics to measure PEC from a financial perspective

ID	Metric	Definition	Freq.	References
FP01	Increase in sales volume	$\frac{(SRPP - SRLP)}{SRLP} * 100$ <p>Where: SRLP: Sales Return for the Last Period SRPP: Sales Return for the Present Period</p>	32	A02, A03, A05, A06, A04, A11, A09, A10, A15, A22, A23, A20, A24, A25, A26, A27, A35, A36, A37, A38, A39, A40, A41, A49, A48, A50, A51, A45, A46, A55, A56, A65
FP02	Cost reduction	$\frac{CVLP - CVPP}{CVLP} * 100$ <p>Where: CVLP: Cost Value for the Last Period CVPP: Cost Value for the Present Period</p>	24	A01, A03, A05, A06, A04, A09, A10, A12, A15, A22, A23, A20, A28, A36, A37, A38, A40, A41, A42, A49, A52, A50, A46, A53
FP03	Gross profit	<i>Total Sales – Cost of Goods</i>	13	A02, A11, A12, A15, A16, A29, A22, A20, A30, A43, A49, A47, A66
FP04	Company results	Perception of the performance in Likert scale.	8	A46, A56, A67, A63, A68, A65, A69, A70
FP05	ROI (return on investments)	$\frac{(Gain\ from\ Investment - Cost\ of\ Investment)}{Cost\ of\ Investment}$	5	A22, A20, A38, A43, A72
FP06	ROA – Return on assets	$\frac{Net\ Profit}{Total\ of\ assets}$	3	A02, A22, A49
FP07	Return growth	$\frac{(RPP - RLP)}{RLP} * 100$ <p>Where: RLP: Return for the Last Period RPP: Return for the Present Period</p>	2	A47, A51
FP08	Acquisition cost	$Purchase\ price + Transportation\ of\ inventory + OC$ <p>Where: OC: Other costs attributable to the acquisition of merchandise, materials, or services</p>	2	A01, A22
FP09	ROS – Return on sales	$\frac{Operating\ Profit}{Net\ Sales}$	2	A02, A23
FP10	Increase in turnover rate	$\frac{Sales\ for\ the\ period}{Average\ stock\ for\ the\ period}$	1	A38
FP11	Sales profitability	Sales performance perception using a four-item Liker scale	1	A57

\* Likert: Data collected using a 5-point Likert scale.

Table 4. Metrics to measure PEC from a customer-market perspective

ID	Metric	Definition	Freq.	References
CP01	Increase in overall satisfaction level	Overall satisfaction perception in the business (Likert).	9	A05, A04, A12, A17, A29, A30, A21, A38, A53
CP02	Customer satisfaction for online services	Customer satisfaction for online purchases, both for the delivered product/service and the delivery service. (Likert)	9	A04, A12, A29, A30, A38, A40, A46, A53, A64
CP03	Brand awareness	$\frac{\text{People who recall the brand}}{\text{Total of surveyed people}}$	5	A03, A20, A18, A41, A51
CP04	Market penetration	$\frac{\text{Total of Customers}}{\text{Total of Market segment}}$	4	A13, A12, A16, A41
CP05	Market share	$\frac{\text{Total sales for these period}}{\text{Total sales for this period for the whole Industry}}$	3	A16, A20, A26
CP06	Website performance	Collection of metrics like users, duration of time, pages per visit, bounce rate, and return rate stand out.	2	A19, A20
CP07	Improvement in customer management	Perception of Improvement in customer management. (Likert)	2	A09, A37
CP08	Customer retention	$\frac{\text{Beginning}}{\text{End}}$ Where: Beginning: number of customers at the beginning of a period End: number of customers who remained customers at the end of a period	2	A58, A59
CP09	New customers	New customers generated in a period.	2	A09, A41
CP10	Improvement in online shopping experience	Customer's perception of value. (Likert)	2	A07, A19
CP11	Utility	Customer's perception based on a product or service's utility. (Likert).	2	A31, A34
CP12	EC performance	$W1 * \text{Financial Resources} + W2 * \text{Perceived benefits} + W3 * \text{Content}$ Where: w1, w2, w3 are correlation coefficients.	2	A05, A32
CP13	Conversion rate	$\frac{\text{Number of Conversions}}{\text{Total number of visits to the EC site}}$	2	A20, A45
CP14	Marketing performance	$W1 * \text{Marketing activities} + W2 * \text{Profitability} + W3 * \text{Customer satisfaction} + W4 * \text{Sales}$ Where: W1 to W4 are correlation coefficients calculated through customer perception (Likert).	2	A12, A42

continued on following page

Table 4. Continued

ID	Metric	Definition	Freq.	References
CP15	Improve the relationship with the customer	Estimated through customer perception (Likert).	1	A28
CP16	Loyalty level	<p>Customer loyalty, willingness to continue as a customer, and recommendations to others are assessed through customer perception using the Net Promoter Score (NPS)</p> $\frac{(Number\ of\ promoters - Number\ of\ detractors)}{Total\ Number\ of\ Respondents}$ <p>NPS = * 100 Where: - <b>Promoters</b> (score 9-10): Loyal enthusiasts who will keep buying and refer others, fueling growth. - <b>Passives</b> (score 7-8): Satisfied but unenthusiastic customers who are vulnerable to competitive offerings. - <b>Detractors</b> (score 0-6): Unhappy customers who can damage your brand and impede growth through negative word-of-mouth.</p>	1	A58
CP17	Increase in web traffic	$\frac{Web\ traffic\ in\ present\ period}{Web\ traffic\ in\ last\ periods} * 100$	1	A06
CP18	Brand value	$W1 * Brand\ value + W2 * Quality +$ $W3 * Customer\ Loyalty + W4 * Brand\ association +$ $W5 * Awareness + W6 * Image$ <p>Where: W1 to W6 are correlation of coefficients calculated through customer perception (Likert).</p>	1	A41
CP19	New markets	New markets reached with the same product portfolio	1	A41
CP20	Customer base	Quantity of customers who remain in the following period	1	A04
CP21	Customer oriented process	$\frac{Cnegotiation}{Ctotal} * 100$ <p>Where: • <i>Ctotal</i> = Total number of customers in the previous period. • <i>Cnegotiation</i> = Number of customers who entered the negotiation process in the previous period.</p>	1	A28
CP22	Personalize products/services	Personalize the capability of products/services by customers (Likert)	1	A40
CP23	Development of new products	Total of development of new products in a period	1	A12
CP24	Differentiation	Measurement of differentiation in the market through customer perception. (Likert)	1	A40
CP25	Easier access to information	Ease in giving access to information. (Likert)	1	A40
CP26	Marketing efficiency	$\frac{Total\ of\ marketing\ expense}{Expected\ expense}$	1	A10
CP27	New products Customer services	$\frac{Total\ number\ of\ new\ services\ purchased}{Total\ number\ of\ Unique\ Customers}$	1	A12
CP28	Number of links	Number of links from the market due to improvement in brand presence	1	A12
CP29	Increase customer responsiveness	Degree to which portal service providers are willing to help users and provide timely service (Likert).	1	A38

continued on following page

Table 4. Continued

ID	Metric	Definition	Freq.	References
CP30	Increase in quality assurance	$\frac{AOD \text{ current period} - AOD \text{ previous period}}{AOD \text{ previous perdios}} * 100$ Where: AOD is Assurance of deliverables calculated through stakeholders perception (Likert).	1	A38
CP31	Effectiveness of commercialization	$\frac{Total \text{ revenue generated by the product}}{Total \text{ costs of comercialization}}$	1	A12
CP32	Customer turnover	$\frac{Number \text{ of customers lost during the period}}{Number \text{ of customers at the start of the period}} * 100$	1	A16

Table 5. Metrics to measure PEC from a business processes perspective

ID	Metric	Definition	Freq.	References
BP01	Business process performance	$\frac{(Quality + Process Efficiency + Task speed)}{Total Cost}$	13	A06, A15, A23, A25, A33, A54, A71, A67, A63, A68, A65, A69, A70
BP02	Operational cost performance	$\frac{Present \text{ operational cost}}{Operational \text{ costo from previous period}}$	6	A06, A15, A29, A22, A38, A60
BP03	Perceived utility	Perceived utility by management in Likert scale	2	A34, A66
BP04	Increase in quality	$W1 * Fast \text{ delivery} +$ $W2 * Increase \text{ product or service quality} +$ $W3 * Increase \text{ in information quality} +$ $W4 * Reduction \text{ of transaction errors} +$ $W5 * Increase \text{ in quality of relationships with partner}$ Where: W1 to W5 are correlation of coefficients calculated through customer perception (Likert). Is possible to include other variables like Logistics Service Quality (LSQ)	2	A40, A60
BP05	Productivity	$\frac{Usage \text{ of resources}}{Capability}$	2	A15, A18
BP06	Efficiency performance	$\frac{Total \text{ revenue}}{Total \text{ cost of Adquisition} + Commercialization + Coordination}$	1	A57
BP07	Business sustainability	Perception of business sustainability calculated through stakeholders' perception (Likert).	1	A72
BP08	Improvement in supply chain	Improvement in the performance of value chain processes calculated through stakeholders' perception (Likert scale).	1	A42

\* Data collected using a 5-point Likert scale have following formula:

$$Likert \text{ scale} = \frac{Sum \text{ of Likert values}}{Number \text{ of response}}$$

**Table 6. TOEC factor categories that influence EC profitability in SMEs**

Categories	Description	Factors	Studies
Technological	Includes all company technologies in use and available but not yet implemented.	18	34
Organizational	Involves company characteristics, resources, and employee structures.	32	57
Environmental	Encompasses industry structure, technology providers, and regulations.	14	22
Consumer	Refers to consumer impact on SME e-commerce profitability.	9	12

**Table 7. Technological factors that influence EC in SMEs**

ID	Factors	Description	Freq.	References
TF01	Technological competence	E-marketing tools, supply chain facilities, and electronic service reliability.	21	A01++, A06++, A14++, A12++, A18++, A17++, A22++, A23++, A20++, A30 ++, A21++, A27++, A36++, A37++, A38++, A43++, A52++, A51++, A53++, A66++, A73++
TF02	EC content and experience	EC content, user experience, presentation, features like ordering, tracking, and personalized service	7	A05++, A23++, A31++, A20++, A38++, A60++, A63++
TF03	Safety and trust	Safety information visibly shown on the web to website visitors	7	A01++, A06++, A20++, A21++, A17++, A31++, A63++
TF04	Usability and interactivity	Website usability, with features for easy purchasing or information access, simplifies navigation and supports interactivity for customer engagement.	6	A05++, A28++, A63++, A69++, A22++, A31++
TF05	Design	Relates to EC design elements that improve usability, interaction, and user experience	6	A17++, A31++, A41++, A45++, A46++, A63++
TF06	Marketing support	Marketing management with product visuals, discounts, free returns, and dynamic pricing.	4	A10--, A39++, A45++, A63++
TF07	Method and speed of merchandise delivery	Alternatives of product delivery options and their associated costs. Free delivery stands out as a positive influential factor.	4	A30++, A39++, A45++, A63++
TF08	EC performance – Non-functional	Website response time	2	A17++, A45++
TF09	Information quality	Information quality provided to all business partners and consumers.	2	A22++, A46++
TF10	System quality	Perceived ease of use, precision, and reliability.	2	A22++, A46++
TF11	Internet connectivity	Internet access level established for internal company and external customer connections.	1	A32++
TF12	Digital analytics	Goal setting establish to evaluate the current performance of a business.	1	A20++
TF13	Complexity	Complexity of technologies	1	A06++
TF14	Perceived Internet usage	Utility of the EC service perceived by stakeholders	1	A54++
TF15	Privacy	Elements and messages that clearly convey the consumer's information is private	1	A21++
TF16	Scalability	Degree of scalability provided by the technology	1	A06++
TF17	Cloud computing	Data storage and management on virtual servers, offering anytime, anywhere access for improved cost-efficiency and flexibility.	1	A38++
TF18	Compatibility	Alignment of innovation with adopter's values, past practices, and needs.	1	A28++

**Table 8. Organizational factors that influence EC in SMEs**

ID	Factor	Description	Freq.	References
OF01	Customer management services	Customer management services before and after the sale through various tools, such as CRM	15	A01++, A08++, A10++, A12++, A31++, A26++, A33+, A21++, A37++, A34++, A53++, A51++, A59++, A61++, A70++
OF02	Innovation	Activities related to EC innovation: support, new product development, user co-creation, and digital disruption.	13	A02++, A02--, A03++, A11++, A14++, A13++, A23++, A26++, A43++, A49--, A49++, A53++, A62++, A61++, A70++
OF03	Owner and internal interested parties	SME leadership's role in fostering EC commitment through support and participation.	12	A01++, A05++, A06++, A17++, A29++, A22++, A23++, A25++, A52++, A53++, A68++, A69++
OF04	Strategic planning	It refers to the strategic planning activity that the business does and impacts EC, sometimes specifically referred to as EC strategy.	11	A03++, A15++, A17++, A23++, A20++, A40++, A44++, A49++, A47++, A57++, A70++
OF05	Marketing activities	EC marketing activities like website viewing, SEO/SEM, display advertising, email, mobile presence, and social media marketing.	8	A20++, A51++, A47++, A60--, A66++, A72++, A65++, A69++
OF06	Organizational structure - Interorganizational	Concerns EC problem-solving through partnerships and alliances: trust, pressure, geographic distance, external relations management.	7	A06++, A23++, A33+, A36++, A44--, A42++, A61++
OF07	Financial resources	Allocated budget for setting up, updating, and improving the EC platform.	7	A05++, A14++, A12++, A17++, A23++, A54++, A66++
OF08	Talent management	Staff with IT and EC management expertise, including dedicated support and training personnel."	7	A10++, A17++, A22++, A23++, A38++, A34++, A42++.
OF09	Inter-area communication and coordination	Capability and culture to develop activities between Marketing and Operations, Operations and Innovation, and other areas	4	A14++, A04++, A26++, A42++
OF10	Knowledge management	Capability to share client information and market developments	4	A26++, A43++, A42++, A70++
OF11	Company size	Organizational size reflects the company's operating resources and is a significant factor impacting company performance.	4	A05++, A04++, A32++, A54++
OF12	TVI – Transparent and visible information	A transparent environment makes it easier for buyers/sellers to obtain competitive information.	4	A01++, A37++, A53++, A69++
OF13	Service quality	Abundance of information can generate more negotiation possibilities. This factor is considered more critical in B2B.	4	A22++, A33++, A41++, A73++
OF14	Management team's IT knowledge	Search activities aimed at enhancing service quality in EC from multiple angles, including global support, improvisation, and technology focus.	3	A17++, A23++, A52++.
OF15	Perceived financial cost	Implementation costs of B2B technologies can be inhibiting for SMEs, necessitating the discovery of cost-effective adoption and usage solutions.	3	A06++, A10--, A28++
OF16	CEO commitment	The CEO's commitment to EC processes and technology	2	A23++, A53++
OF17	IT skills and experience	IT skills and experience in the organization	2	A05++, A10++
OF18	Marketing skills	Evidenced by digital marketing proficiency	2	A71++, A70++
OF19	Network capability	Network capability fosters internal and external organizational interdependencies, emphasizing the owner's social contacts as crucial.	2	A43++, A56++

*continued on following page*

**Table 8. Continued**

ID	Factor	Description	Freq.	References
OF20	Perceived technological competency	Performance expectations from EC involve SMEs' views on the supporting technical and organizational infrastructure, with a focus on economic, effective, and efficient outcomes.	2	A67++, A68++
OF21	Research and development	Activities of value creation and continuous adaptation process to stay ahead of competitors.	2	A02++, A11++
OF22	Specific provider quality (reputation)	Retail business's reputation: awareness, reputation, discounts and commercial advisor's reputation	2	A44++, A46++
OF23	CEO Innovation	CEO's innovation orientation: idealized influence, motivation, intellectual stimulation, and individual consideration.	3	A43++, A48+, A42++
OF24	Electronic commerce era	Number of years in which companies have been using EC	1	A05--
OF25	Exploitation orientation	Set of practices that refine and expand existing skills and resources	1	A56--
OF26	Exploration orientation	Practices that develop new competencies in the supply chain through experimentation and acquisition of new knowledge and resources	1	A56++
OF27	Founder's tendency to take risks	Perceived probability of receiving rewards associated with the success of a proposed situation	1	A54++
OF28	Internationalization	Orientation to internationalization of SMEs	1	A02++
OF29	Personal motivation	The team's personal motivation level significantly influences the success of the innovation process.	1	A14++
OF30	Communication technology strategy	Existence of information technology strategies and communication in a company	1	A62++
OF31	Offline electronic commerce activities	Sales visit, offline meeting, and online videoconference	1	A59++
OF32	Digital preparation	Set of information technology and communication infrastructures and human resources	1	A62++

## DISCUSSION

### On the Definition of EC Profitability in SMEs

Definitions for EC profitability in SMEs have not been found; however, studies understand profitability as improvement or growth from financial, client, and process perspectives, identifying a total of 70 understandings (see Table 13 in Annex 2). Therefore, this study proposes a definition for EC profitability:

*EC profitability is the EC's results regarding everything that involves the launch and operation of an EC.*

The EC's results can refer to profits (Want et al., 2021), satisfaction (Chen & Hsieh, 2022), among others, and "everything that involves the launch and operation of an EC" can be the platform's development (Cosgun, 2012), service quality (Yang et al., 2015), among others. This definition is not limited to a particular perspective; for example, in the social perspective of governmental EC, EC profitability can be given by the citizens' satisfaction (results) regarding transparency and expenses in a governmental service (launch and/or operation of an EC). In the financial perspective, the most important in private companies, EC profitability is defined as:

**Table 9. Environmental factors**

ID	Factors	Description	Freq.	References
EF01	Industry pressure (External)	Competitive intensity, customer pressure, and institutional pressure.	15	A05++, A06++, A13++, A16++, A24++, A25++, A37++, A42++, A50++, A45++, A55++, A66++, A68++, A69++, A70++
EF02	Level of governmental support	Government backing aids EC adoption, influencing market operations and includes tech infrastructure and policies.	8	A01++, A14++, A13++, A24++, A25++, A55++, A61++, A68++
EF03	Economical	Economic environment, unemployment, economy contraction, prices, capital flows, inflation, energy cost, and influence of price controls.	6	A06++, A13+, A16++, A23+, A25++, A37+
EF04	Sociocultural	Global movements like consumption, habit changes, workforce dynamics, power attitudes, and feminism impact cultural factors.	6	A01++, A06++, A13++, A31++, A25++
EF05	Technology and innovation in the industry	Its presence determines the capability of usage by SMEs.	4	A06++, A14++, A62++, A61++
EF06	Possibility of external support in information systems	Outsourcing is allowed from a legal point of view.	3	A05++, A23++, A65 ++
EF07	Legal aspects	Globally defined legal subjects, human rights, worldwide regulation, customs and tax restrictions, and regulatory climate	2	A14++, A25++
EF08	Business climate	Economic/commercial climate of commercial companies	1	A16++
EF09	Characteristics of the environment	Environmental dynamism, environmental complexity, and environmental hostility.	1	A06++
EF10	Global competitiveness	It's a competitiveness index, gauging national competitiveness through institutions and policies shaping productivity	1	A01++
EF11	Industry networks	Relationships facilitate knowledge exchange through interactions between individuals and companies.	1	A14++
EF12	Industry type	Type of environment in which the SME performs, be it monopoly or competition.	1	A16++
EF13	Market entry barriers	Effects of market entry barriers on the money of commercial companies in industry types.	1	A16++
EF14	Substitute products	The possibility to find products like those offered by other companies in other markets.	1	A13++

**Table 10. Consumer factors**

ID	Factor	Description	Freq.	References
CF01	Perceived utility	EC utility and benefits as perceived by different parties that interact with that EC	5	A22++, A38++, A34++, A54++, A64++
CF02	Customer trust	Customer trust in business processes	2	A21++, A34++
CF03	Seasonal and calendar effects	Seasonality of services	2	A19++, A45++
CF04	Satisfactory web experience	Give positive web experience to customers	2	A29++, A21++
CF05	Experience value	Provision of relevant information, ease of website use, and customer service	1	A07++
CF06	Relationship quality	Customer satisfaction and trust are vital for building lasting relationships and securing repurchase intentions.	1	A58++
CF07	Value perception	Net benefits that customers receive through the purchase of products or services	1	A21++
CF08	Personal values	Consumption holds social significance, shaping consumer identity and social relations.	1	A07++
CF09	Usage patterns	Level of adoption of EC usage	1	A06++



*EC profitability from a financial perspective is the profitability of the total investment conducted for the launch and operation of an EC.*

This last definition is not limited to the advancement of technologies and involves, from a financial point of view, the ratio between everything that is needed for the launch and operation of an EC (technologies, processes, personnel, models, etc.) and the revenue that this can generate for the organization.

### On Metrics of EC Profitability in SMEs

Many studies analyzed in this article have touched the subject of metrics to determine EC profitability from financial, client-market, and operational perspectives. Results show that the most used metrics are financial, undoubtedly because each of these is associated with the revenue obtained by EC, with *increase in sales*, *cost reduction*, and *profitability* as the most studied. Client-market metrics are associated with customer management; marketing automation; specialized management software, such as CRMs and email marketing; and prediction of EC operational performance for future optimization. This category involves *Increase in overall satisfaction level* (CP01), *Customer satisfaction for online services* (CP02), *Brand awareness* (CP03), and *Market penetration* (CP04), among others. In operational metrics, those that are oriented to measuring quality, performance of assets associated with the operation, and improvement in the supply chain are crucial activities to achieve compliance with the offer (promise) made by the business through its EC platform, among which *Business process performance* (BP01), *Operational cost performance* (BP02), and *Increase in quality* (BP04) are the most studied.

The identified metrics only cover three of the four perspectives outlined by Kaplan and Norton (2008), neglecting crucial areas like innovation (Parmenter, 2020), essential for measuring EC profitability, especially with the emergence of technologies like the metaverse. Moreover, 84% of the metrics are subjective, relying on perceptions or including subjective variables in their formulas, highlighting the need for more objective performance measures. Additionally, certain metrics related to EC were excluded because they don't directly assess its performance, such as those measuring overall company performance (A04) or innovation impact (Afriyie et al., 2020).

### Factors That Influence EC Profitability in SMEs

Seventy-three factors were identified and classified into four categories, according to what is established by TOE (Technological, Organizational, and Environmental) (Tornatzky & Fleischer, 1990), to which customer interaction with the business was added since this influences the decision-making of the purchase. Results show that the most studied factors are “organizational” with 32 factors in 57 articles, mainly associated with marketing and operational processes as well as the development of talent and work teams, where the main factors are *Customer management services* (OF01), *Innovation* (OF02), *Owner and internal interested parties* (OF03), and *Strategic planning* (OF04). In the “technological” category, 18 factors were identified in 34 studies, above all related to EC operation and optimization as well as to access to technological resources, among which *Technological competence* (TF01), *EC content and experience* (TF02), and, finally, *Safety and trust* (TF03) stand out. Also, 14 “environmental” factors were found in 22 studies, especially associated with external pressure and opportunities perceived by the organization, with *Industry pressure* (EF01) and *Level of governmental support* (EF02) as the most influential. Finally, in the “consumer” category, nine factors were found in 12 studies, among which *Perceived utility* (CF01), *Customer trust* (CF02), *Seasonal and calendar effects* (CF03), and *Satisfactory web experience* (CF04) stand out.

Selected articles aimed for positive PEC but factors studied didn't always influence PEC positively. Decreases sometimes had positive impact, e.g., Africa, USA, Australia, China. No demonstrated bias, propose future research challenge.

Literature cites multiple phases in the consumer's shopping process (Wijaya, 2012; Colicev et al., 2018; Siebert et al., 2020; Santos & Gonçalves, 2021). Yet, no identified studies examine factors impacting each phase and EC performance.

### Practical Implications for SMEs

SMEs aiming to leverage this study's findings in the EC field should prioritize implementing precise performance metrics that capture operational efficiency and customer satisfaction. This entails monitoring sales, costs, and comprehensively understanding the customer journey while enhancing digital engagement. Additionally, adapting to emerging EC trends, like AI-driven personalization and logistics integration for improved delivery and inventory management, is crucial. By integrating these strategies, SMEs can enhance their competitiveness in a dynamic market.

### Limitations

While this PEC analysis draws primarily from literature indexed in Scopus and Web of Science, it may not capture all available research, particularly works in different languages or from alternative databases. Reliance on quantitative metrics and varying definitions of success may not fully capture the complexities of EC across diverse cultural contexts.

To enhance future research, incorporating a broader range of sources and qualitative methodologies is advisable. Case studies, for example, can provide detailed insights into the practical application of EC strategies. Additionally, exploring how SMEs can leverage advanced technologies like Generative AI, AutoML, IoT, and the Metaverse to enhance profitability is essential. Moreover, it's crucial to examine how EC practices can promote corporate sustainability and social responsibility.

## CONCLUSION AND CHALLENGES

This article presents a systematic review of literature of 73 primary articles from journals indexed in Scopus or Web of Science that address metrics to evaluate performance and factors that influence EC profitability in the environment of SMEs, corresponding to the period of January 2011 to July 2021. Fifty-one metrics were identified in three categories (financial, customer-market, and process) and 74 factors in four categories (technological, organizational, environmental, and consumer); moreover, 28 different definitions for EC and no definition for EC profitability were identified, and a definition for EC and for its profitability were proposed, valid for SMEs and large companies.

Seventy ways of understanding EC profitability have been found, which are oriented to the improvement or growth from financial, client, or process perspectives, but that do not define EC profitability; therefore, a definition was proposed that is not limited to one perspective nor to the advancement of technologies but that can be particularized to them. For example, in the financial perspective, the most important in private companies, the definition is: "*EC profitability from a financial perspective is the profitability of the total investment conducted for the launch and operation of an EC.*"

This research has allowed us to understand how to evaluate EC profitability in SMEs, with financial metrics as the most studied, such as *Increase in sales volume* (FP01), *Cost reduction* (FP02), and *Gross profit* (FP03). In the customer-market perspective, the most studied metrics are *Increase in overall satisfaction level* (CP01), *Customer satisfaction for online services* (CP02), *Brand awareness* (CP03), and *Market penetration* (CP04). In the process perspective, the most studied metrics are *Business process performance* (BP01), *Operational cost performance* (BP02), and *Increase in quality* (BP04). On the other hand, there are gaps in the metrics; for example, performance is not measured from technological innovation, social responsibility, and value cocreation perspectives despite all of them being particularly important in EC.

It has been identified that the factors in the "organizational" category (32 factors) are the most studied, among which are *Customer management services* (OF01), *Innovation* (OF02), and *Owner*

and internal interested parties (OF03). In the “technological” category, 18 factors were identified, with *Technological Competence* (TF01), *EC content and experience* (TF02), and *Safety and trust* (TF03) as the most studied. Also, 14 “environmental” factors were found, with *Industry pressure* (EF01) and *Level of governmental support* (EF02) as the most influential. Finally, in the “consumer” category, nine factors were found, among which *Perceived utility* (CF01), *Customer trust* (CF02), and *Satisfactory web experience* (CF04) stand out. On the other hand, only one study (Di Fatta et al., 2018) that covers two factors (CF03) in the “shopping” phase has been identified.

Due to this study, four challenges to improve EC profitability in SMEs are proposed:

- *To establish new metrics to measure EC profitability beyond the financial, customer-market, and process categories.* This will enable the measurement and better understanding of EC profitability. For example: technological innovation, social responsibility, and value cocreation have a significant role in the launch and operation of the EC and, consequently, its profitability.
- *To transform subjective metrics into objective and for them to be directly determined from EC platforms.* This is because it helps to reduce the errors that generate perception and to know EC profitability in real time, making decisions quicker and better.
- *To prioritize factors that influence EC profitability and each of its phases.* This will enable a better understanding of what affects EC profitability and prioritize the treatment of factors in each of its phases since SMEs present capability and budget limitations.
- *To establish practices to mitigate negative factors and enhance positive factors that influence profitability.* The implementation of these practices will enable an increase in EC profitability; in the financial perspective, this means it will be more profitable.

## COMPETING INTERESTS AND FUNDING

The authors of this publication declare there are no competing interests and funding.

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## APPENDIX

### Annex 1

Studies reviewed during research:

A01:(Chong et al., 2011); A02:(Pett & Wolff, 2011); A03:(Wang et al., 2011); A04:(Ramanathan et al., 2012); A05:(Cosgun, 2012); A06:(Sila & Dobni, 2012); A07:(Iniesta-Bonillo et al., 2012); A08:(Harrigan et al., 2012); A09:(Mbatha, 2013); A10:(Chen & Zhang, 2013); A11:(Thompson et al., 2013); A12:(Eid & El-Gohary, 2013); A13:(Hulbert et al., 2013); A14:(Hardie et al., 2013); A15:(Hashim a&nd Abdullah, 2014); A16:(Miles, 2014); A17:(Wu et al., 2014); A18:(Georgios et al., 2014); A19:(Moral et al., 2014); A20:(Ghandour, 2015); A21:(Li et al., 2015); A22:(Ghobakhloo et al., 2015); A23:(Yang et al., 2015); A24:(Albano et al., 2015); A25:(Zhang et al., 2015); A26:(Ma et al., 2015); A27:(Taiminen & Karjaluo, 2015); A28:(Ainin et al., 2015); A29:(Changchit & Klaus, 2015); A30:(Hirogaki, 2015); A31:(Wang et al., 2015); A32:(Chen & Zhang, 2015); A33:(Al-Ansaari & Bederr, 2015); A34:(Herzallah & Mukhtar, 2016); A35:(Lekhanya, 2016); A36:(Khan et al., 2016); A37:(Chong et al., 2016); A38:(Chen et al., 2016); A39:(Song et al., 2016); A40:(Elbeltagi et.al., 2016); A41:(Haibo et al., 2016); A42:(Scuotto, Caputo et al., 2017); A43:(Scuotto, Del Giudice, et al., 2017); A44:(Xu et al., 2017); A45:(Di Fatta et al., 2018); A46:(Alawi et al., 2018); A47:(Saridakis et al., 2018); A48:(Shemi and Procter, 2018); A49:(Popa et al., 2018); A50:(Kitchens et al., 2018); A51:(Ghandour, 2018); A52:(Gunawardana, 2018); A53:(Chong et al., 2018); A54:(Sharifonnasabi et al., 2018); A55:(Hånell et al., 2019); A56:(Cenamor et al., 2019); A57:(Yu et al., 2019); A58:(Agag, 2019); A59:(Jiang et al., 2019); A60:(Sorkun, 2019); A61:(Loon and Chik, 2019); A62:(Alam et al., 2019); A63:(Svatosova, 2020); A64:(Meiryani et al., 2020); A65:(Jovanovic et al., 2020); A66:(Patma et al., 2020); A67:(Shahzad et al., 2020); A68:(Hussain et al., 2020); A69:(Qalati et al., 2020); A70:(Lestari et al., 2020); A71:(Umar et al., 2020); A72:(Purba et al., 2021); A73:(Jun et al., 2021)

### Annex 2

EC performance from different points of view as authors understand performance (See Table 11).

Table 11. EC performance by points of view

ID	Perspective			Article
	Financial	Customer	Process	
P01		✓	✓	A01
P02	✓			A02
P03	✓			A03
P04	✓	✓		A05
P05	✓	✓		A06
P06		✓	✓	A04
P07	✓	✓		A11
P08		✓	✓	A09
P09	✓	✓	✓	A12
P10	✓			A07
P11	✓	✓	✓	A12
P12	✓		✓	A15

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Table 11. Continued

ID	Perspective			Article
	Financial	Customer	Process	
P13	✓		✓	A16
P14			✓	A19
P15	✓		✓	A18
P16		✓		A17
P17	✓	✓		A29
P18	✓	✓		A22
P19	✓	✓	✓	A23
P20	✓	✓	✓	A31
P21	✓	✓	✓	A32
P22	✓	✓		A20
P23	✓			A24
P24	✓		✓	A28
P26	✓	✓		A26
P27		✓	✓	A33
P28			✓	A21
P31	✓		✓	A36
P32			✓	A37
P33		✓	✓	A38
P36	✓	✓	✓	A41
P37			✓	A34
P39	✓			A43
P42	✓	✓		A49
P46		✓	✓	A51
P47	✓	✓		A47
P48	✓		✓	A45
P49		✓		A46
P50		✓	✓	A54
P51	✓	✓	✓	A53
P52	✓		✓	A55
P53			✓	A58
P54	✓			A56
P55	✓	✓		A59
P56		✓		A62
P57			✓	A60
P59	✓	✓		A57

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Table 11. Continued

ID	Perspective			Article
	Financial	Customer	Process	
P61	✓	✓		A71
P62		✓	✓	A67
P63		✓	✓	A63
P64			✓	A66
P65	✓	✓	✓	A72
P66	✓	✓		A73
P67	✓	✓		A68
P68	✓	✓		A65
P70		✓		A70

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