



Article

Critical Factors in Indonesia's E-Commerce Collaboration

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Abstract: Indonesia's e-commerce development, with growth forecast of up to USD 300 billion by 2020, encourages many e-commerce companies to create new value in their products/services. Opportunities for e-commerce start-up collaboration programs increase the opportunities for e-commerce to grow. In e-commerce, decision-making for collaborations tends to be intuitive, centralized, and does not use strategic management tools. This study aims to identify critical factors as the main consideration in collaborative decision-making between e-commerce companies and partners. The study was conducted by developing a questionnaire for decision-makers in e-commerce collaborations. The study used the TOE framework, AHP, and TOPSIS methods. As part of the research's object, the payment method was chosen for an e-commerce company collaborative program. Based on the criteria identified against the existing framework, there are 11 critical factors. The top three criteria are (1) networks and cooperation, (2) management commitment, and (3) knowledge and expertise in digital business. Based on the TOE framework, the main priority is the provision of e-wallet payment methods, which can be done by adding service providers. While research is limited as to the factors' priority, future studies are suggested to select other collaborative programs or develop a collaborative strategy framework.

Keywords: e-commerce; collaboration; partnership; AHP; TOPSIS



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1. Introduction

E-commerce or electronic commerce can be defined as buying and selling activities through online internet facilities. The adoption of e-commerce will facilitate the sale of goods and services and be faster in promoting products to the public [1]. There are financial and non-financial transaction activities between consumers and third parties in e-commerce [2]. Departing from a start-up business that relies on technology, electronic commerce includes commercial activities and includes collaboration with business partners and client services. Data from Tech in Asia show that in the second quarter of 2017, start-ups that dominate in Indonesia came from the e-commerce and financial technology (fintech) industries. According to a McKinsey & Co. Report, the potential for e-procurement through online B2B channels in Indonesia will reach USD 125 billion by 2025. This estimate combines global corporate services (USD 18 billion), the B2B marketplace (USD 76 billion), and B2B services (USD 36 billion).

In the world of start-ups, partnerships between start-ups are known as collaboration. Collaboration helps increase business scale and service reach in the form of new services or products. Even the collaboration of a start-up company can increase the business valuation up to 20 times. Collaboration with start-up partners currently tends to be intuitive and centralized. In decision-making, start-up companies often do not use strategic management tools. With centralized decision-making, start-up companies take a more flexible and adaptive path in decision-making [3].

Critical factors are things that need to be considered by organizations to ensure business sustainability. Critical factors represent managerial and organizational activities that must be given special attention to achieve the organization's goals [4]. Regarding the

success of electronic commerce in Japan, South Korea, and the United States, there are five determinants of the success of electronic commerce: (1) customer orientation, (2) ease of use of applications, (3) product or service variations, (4) product and service delivery, and (5) service speed aspects for Asian countries and service security aspects for the United States [5].

Apart from the success factors, the constraints on the development of electronic commerce were identified through research on determining factors. The inhibiting factors for e-commerce related to the development of e-commerce products/services are: (1) an economic barrier in the form of the inability of information technology infrastructure to provide services at the consumer level so that the adoption rate of electronic commerce is low; (2) the sociopolitical aspect at the business level, which is the interest in developing relationships among business actors to develop electronic commerce at the consumer level [6].

The authors have summarized the e-research related to e-commerce collaboration. Research related to the operation of e-commerce collaboration has been conducted by [7] in Spain and [8] in Taiwan focusing on information systems. In both papers, AHP was used as a tool. Furthermore, research related to the strategy of e-commerce collaboration has been conducted by [9] in Portugal, [10,11] in the USA, and [12] in Taiwan focusing on B2B. Moreover, research related to the adoption of e-commerce collaboration has been conducted by [13] in Saudi Arabia, [14,15] in Indonesia, and [16] in New Zealand, focusing on B2B and SME. Research related to the entrepreneurship of e-commerce collaboration has been conducted by [17] in South Korea, [4,18] in Thailand; this research focused on e-commerce and start-ups, using methods such as CSF, AHP, and SEM. In addition, in 2020, research related to collaboration in e-commerce was conducted by [19] in the USA, focusing on start-ups and corporations using analytical frameworks.

Critical factors can be used in various types of businesses, but their use in electronic commerce start-ups is still limited to the stage of creating a business design. In addition, it is necessary to further study the characteristics of electronic commerce start-ups after entering the market and their success factors so this can lead to better and more sustainable operations [20].

From the research gaps and backgrounds traced by the authors, the problem formulations determined in this study are:

1. What are the determining factors in collaboration between partners in the electronic commerce environment?
2. What is the priority level of each factor of electronic commerce?

The novelty of this research is the ranking of the framework as a priority in determining the collaboration between e-commerce organizations and partners from the perspective of the organization, while the object being studied is the selection of payment methods. The framework priority and factors obtained in this study can be used as the basis for making decisions in determining the new payment method that will be applied by the organization for the development of an e-commerce business.

2. Literature Review

A critical factor is an input for project management that directly or indirectly leads to project success [21]. These factors can be used for planning, process, system creation, programs or projects, and products to achieve individual goals [22]. Critical factors have several identifying features, namely:

- They should be straightforward to understand;
- Critical factors focus on the success factors of an initiative launched by an individual or group;
- Critical factors can be part of the strategic planning process, system or program implementation, improving technical processes, and work performance.

By identifying critical factors, management can:

1. Reduce the risk of failure in the business and strategies for meeting organizational targets;
2. Further understand major change ideas and initiatives;
3. Increase the use of critical factors in other programs, projects, products, or systems.

The critical factors approach has received wide recognition in various studies. However, there are no standard rules regarding identifying the critical factors that have been developed so far [23].

E-commerce refers to using the internet and other networks (for example, an intranet) to buy, sell, transport, or trade data, goods, or services. E-commerce acts as a facility provider in the digital transaction process for both online sellers and buyers, which brings many benefits such as personalization, increased variety of products and information, and interactivity between sellers and buyers [24].

In general, electronic commerce reduces costs, time, and distance in business operations, resulting in a good customer experience, excellent efficiency, product development, and greater profits [25].

There are several dimensions that determine whether an organization sells traditionally or sells electronically. The dimensions of the level of digitization of electronic commerce can be divided into [2]:

1. Products or services being sold;
2. The buying and selling process including ordering, payment, and location fulfillment;
3. Payment method.

Currently, collaboration in start-up companies increases due to pressure from competition between competitors, increasing research costs, increasing national regulations, and accelerating product development. Cross-business collaboration is carried out to create a vital resource and show the competitive value of a product [25].

Strategic collaboration (partnership) is developed for providers to:

1. Reduce inventory and logistics costs;
2. Speed up component availability;
3. Strengthen the quality of the components and reduce the rate of product defects;
4. Drive cost savings for organizations and providers.

In developing collaboration with electronic trading start-ups that involve many companies, each company has a position and role in providing added value to products/services provided by electronic commerce. The description of the collaboration flow based on the flow of the process of purchasing goods through the e-commerce platform can be described in Figure 1.

An innovation framework in digital business includes the entire organization from products to processes through to marketing. Any new inventions or ideas from partners should be mapped to identify the added value associated with the innovation. This becomes important because the potential value of innovation can be elaborated on currency units, amounts per cluster, and other measures depending on data availability [26].

Electronic wallet (e-wallet) payment methods gained popularity in e-commerce in 2016. E-commerce companies also develop collaborations to add e-wallet options to their respective platforms. Examples of electronic wallet companies in Indonesia that have collaborated on electronic trading platforms include GoPay, OVO, DANA, LinkAja, and ShopeePay.

Paylater is similar to the credit card payment method. In this method, the application company first covers the payment of user bills on the seller's side. After that, the user pays the bill to the application company. The use of this payment method provides an advantage because the process of completing transactions is faster for consumers than previous schemes. The chances of a consumer losing their money in a "hit and run" are much smaller. This method targets financially constrained users who do not yet have a credit card due to constraints on requirements. Paylater providers in Indonesia include Kredivo, Shopee Paylater, Traveloka, and OVO.

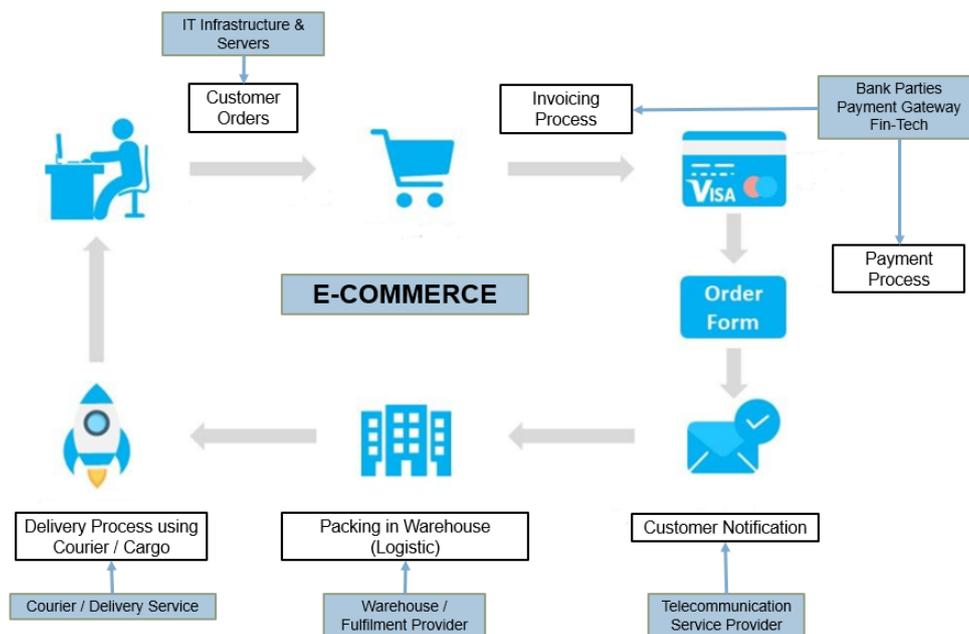


Figure 1. E-commerce collaboration position with partners.

COD was derived from the words “cash on delivery” or the payment on the spot method. COD is a payment method in online business that allows buyers to pay when the goods are received. In other words, COD can be defined as an agreement between the buyer and the seller to make payments when the goods arrive at their destination.

The hierarchy of this research can be described as listing the critical factors of e-commerce collaboration among Indonesian companies. The TOE framework construction was based on 12 (twelve) critical factors as described in the literature review. Each criterion was chosen based on the literature, and the definitions were checked against prior research sources.

The first factor is technology readiness (T1). In general, readiness to use new technology relies on four personality traits: optimism, innovativeness, discomfort, and insecurity, including IT infrastructure integration, joint customer service operations, and online payment mechanisms. This factor also describes the recognition and will to accept new technology development based on customer trends [9,12,16,26]. The second factor is speed and flexibility (T2). Speed refers to conducting business in “internet time” based on technical business models, interaction systems, and IT integration. Flexibility refers to the need to develop custom solutions and increase global competition. The third factor is data and system security (T3), which refers to security issues associated with transactions conducted over the internet. E-commerce needs to ensure that data about e-commerce customers and transactions are safely preserved [9,27,28]. The fourth factor is networks and partnerships (T4). Network reliability is the firm’s ability to successfully transfer critical business applications to and from its supply chain partners over the internet and partners, while partnership selection is an essential step in creating a successful alliance since it enables a more excellent range of distribution and facilitates the convergence of strategic resources, capabilities, and competencies [9,11,13]. The fifth factor is management commitment (O1), defined as a positive attitude from top management to the managerial level toward change, which creates an organizational environment receptive to innovation. It is crucial during the implementation stage, when coordination across organizational units and conflict resolution is necessary [9,13,29]. The sixth factor is benefits for the organization (O2), defined as the degree of acceptance of the possible benefits that e-commerce technology can provide for the organization (such as an increase in efficiency, market growth, and better quality of customer service). The company allocates resources such as managerial, financial, and technological resources [13–15,30]. The seventh factor is skill and expertise

in digital business (O3). This concerns the organization's ability to adopt e-commerce, its expertise in ICT, and penetration of the market with cultural technology. These factors also described the IT team's capability to deal with the uncertainty and risks in technology adoption [13,14,30]. The eighth factor is the distribution channel (O4), which is defined as abilities to dispatch products, receive information feedback, and in promotion in the target market, and the responsive efficiency of distributing patterns. It also concerns all cost controls in the distribution channel and capabilities to allocate the pipeline's profits [8]. The ninth factor is strategy for revenue sharing (O5). The optimal solution regarding revenue under consideration for best business strategy (partition charge) and revenue sharing is structured around the number of customers, services utilized, and how much of the data center assets are allocated [8,31,32]. The tenth factor is partner and customer trust (E1). Customer trust is placed on the transaction and after-sale service of the startup, which affects market opportunity. Partner trust is based on believing that partners will act to achieve positive outcomes and avoid adverse consequences, that actions will yield long-term benefits, and that the organization is continuing a track record with excellent output [9,12,17,33,34]. The eleventh factor is customer satisfaction (E2). Satisfaction of customers with the business's service positively affects the customer's opinion of the company and leads to loyalty. This factor also describes the quality and value of the product that the customer recognizes, which affects the market opportunities for e-commerce [17,32]. The last factor is scalability (E3), which is defined as economies of scale and scope provided by the internet, which integrates products with numerous entities such as customers, suppliers, retailers, etc., and the ability to collaborate to find a new segment of the market [9,17,28].

3. Methods

As the first step, the objectives of evaluation have been determined based on the literature review in Section 2, in which the author identified the critical factors. Critical factors will be classified into several categories, with a framework divided into four levels as follow:

1. The first level is the ultimate goals and objectives;
2. The second level is the framework construction of the critical success factors (CSF);
3. The third level shows the specific CSF within each category [8,35].

To construct the CSF framework, the TOE framework was selected for this research. The TOE framework can be used to study the diffusion of various information systems/information technology innovations, including technical tasks and innovations integrated into the core business [10]. It is advantageous over other adoption models in studying value creation from technology, and it is free from industry and firm-size restrictions. The TOE framework has been widely tested in information technology and information system adoption studies and has been reported to have consistent empirical support [36].

The hierarchy of this research can be described as the critical factors of e-commerce collaboration among Indonesian companies. The TOE framework construction was based on 12 critical factors as described in the literature review section.

After the CSF were determined in the hierarchy structure, the questionnaire was developed to gain detailed topics from the determining factors. The questionnaire scope was limited to employees who were involved in e-commerce collaboration at any level of management. The questionnaire was delivered using a Likert scale from 1 to 5. The least important critical factors were represented with 1, while the most important were represented with 5. After reviewing the results, one of the critical factors, speed and flexibility (T2), was eliminated due to a score below four as a threshold. Therefore, the considered factors become eleven factors for further research with experts (Figure 2).

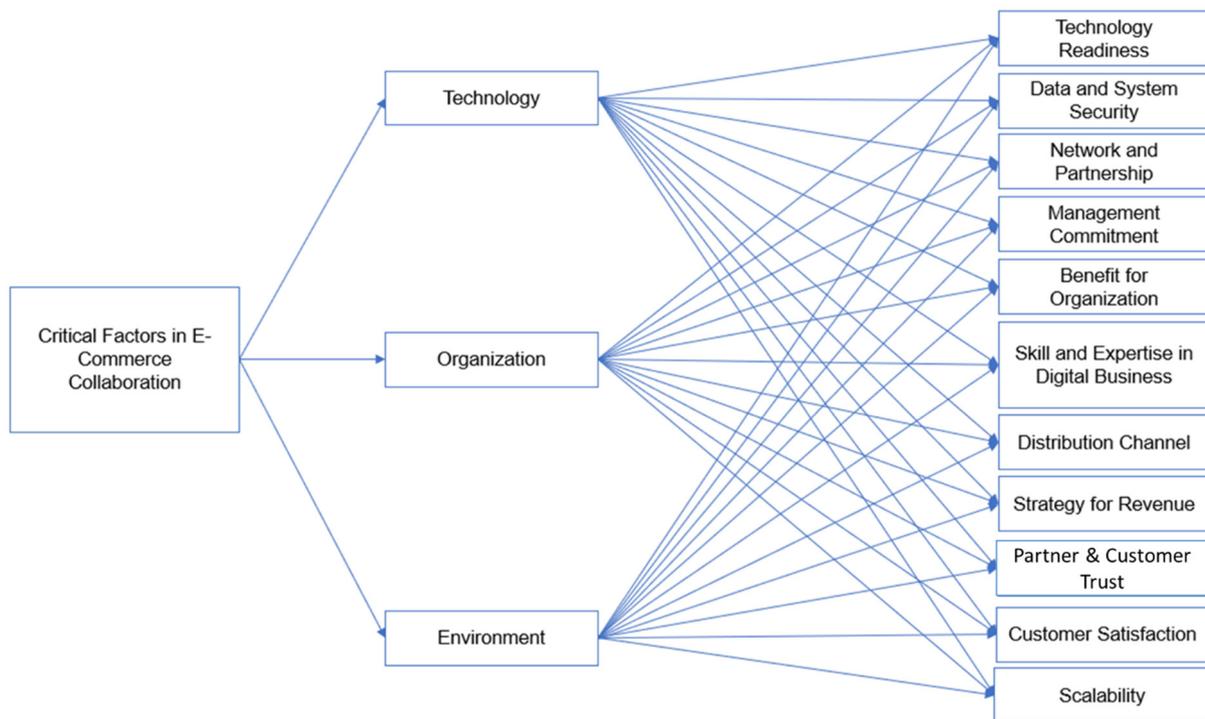


Figure 2. Hierarchy of CSF based on the TOE framework.

The first round of the questionnaire was distributed to respondents with backgrounds in Indonesia’s e-commerce or e-commerce partner industries, with responsibility as a decision-maker. Among 30 questionnaires that were distributed from March to April 2021, 17 were considered complete. The respondents also represented four types of fields related to partnership: sales, product development, operational, and marketing. The results of the 1st round questionnaire eliminated one factor that could be considered not accepted: speed and flexibility (T2). The second-round questionnaire was distributed to respondents with a higher level of decision-making in e-commerce companies. Experts were selected through a background check and work experience, and the survey was conducted from April through May 2021.

There are different multi-criteria decision-making (MCDM) methods available—such as analytical hierarchy process (AHP), elimination and choice expressing the reality (ELECTRE), preference-ranking organization method for enrichment evaluations (PROMETHEE), and technique for order preference by similarity to ideal solution (TOPSIS)—that can be used to calculate, examine, and select decision options. AHP was established in the 1980s [37] and is highly popular. It has been shown to be important in the areas of application performance, corporate policy and strategy, resource management, and political planning and strategy. The ELECTRE method was initially introduced in 1968 by Roy to deal with outranking connections by doing a pairwise comparison between each factor’s alternatives separately [38]. It includes a number of variations created to address various decision-making difficulties, such as selecting, scoring, and explaining concepts [39]. Because ELECTRE focuses on a pairwise examination of choices, it attempts to see if option A is at least as effective as option B [38]. However, an ELECTRE method requires a large number of technical factors, making it difficult to completely comprehend [40]. However, it has not been proven to be a complete answer for dealing with the variables, and its process, as well as its outcomes, may be difficult to understand [38]. PROMETHEE is an easy-to-use method developed by Brans and Vincke in the 1980s [38]. It presupposes that the requirements are proportional. However, this technique does not accurately allocate values and cannot properly allocate weights [40]. Hwang and Yoon introduced TOPSIS in 1981, which is used to rank alternatives using a restricted number of variables [38]. It is

based on the principle of minimizing the negative ideal choice while increasing the good one [38]. TOPSIS is user-friendly and supports quantitative values, with the number of steps being a constant independent of the number of components [38]. Thus, based on the literature, particularly the methods used in this topic, AHP and TOPSIS were selected.

Four experts representing operations and partnerships in the e-commerce industry were selected to make the pairwise comparison of eleven critical factors and three main frameworks. The pairwise comparison data were then processed using the geometrical mean, AHP method, and eigenvector representing each factor's weight. The results of the pairwise comparison geomean are described in Table 1.

Table 1. Geometrical mean of pairwise comparison.

	T	O	E
T	1.00	2.45	1.14
O	0.41	1.00	2.74
E	0.87	0.37	1.00
Sum	2.28	3.82	4.88

Then, using the AHP, the eigenvector calculation for each factor was calculated and is described in Table 2.

Table 2. Rank of frameworks.

	T	O	E	Sum	Priority Weight (e.v)	Rank
T	0.44	0.64	0.23	1.31	0.438	1
O	0.18	0.26	0.56	1.00	0.334	2
E	0.38	0.10	0.20	0.68	0.228	3
Sum	1.00	1.00	1.00	3.00	1.00	

Using the eigenvector, the data were then processed to gain the consistency ratio. The consistency index (CI) was measured using Equation (1). After calculating the CI value, referring to the random index (RI) [37], the consistency ratio (CR) was measured by dividing the CI by the RI. Saaty (1980) [37] set the acceptable ratio as not exceeding 0.1, but the ratio 0.2 area is still acceptable for some cases.

$$\lambda_{\max} = \frac{(3.461 + 3.403 + 3.216)}{3} = 0.298 \tag{1}$$

$$CI = \frac{\lambda_{\max} - n}{n - 1} = 3.54 \tag{2}$$

$$CR = \frac{CI}{RI} = \frac{3.54}{0.58} = 0.164 \tag{3}$$

The consistency ratio for the three main frameworks was 0.164; the ratio shows that the acceptable score and pairwise comparison can be consistent. The calculation of geomean, eigenvector, and consistency ratio was also applied to eleven factors that had been compared pairwise by experts. The results for each factor based on each main factor are stated in Table 3.

The prioritized factors were continued as the basis of the selection of the payment method collaboration program. The TOPSIS method was involved in determining which method was the best selection for program collaboration. The TOPSIS method was conducted by objective assessment of the previous experts. After calculating the assessment data, they were converted into a weighting ratio. The result was that the e-wallet payment method was selected as the first priority alternative (Table 4).

Table 3. Global rank of each factor of TOE framework.

Framework	Partial Weight	Criteria	Global Weight	Global Rank
Technology (T)	0.438	T1. Technology Readiness	0.078	6
		T3. Data and System Security	0.041	11
		T4. Network and Partnership	0.175	1
Organization (O)	0.334	O1. Management Commitment	0.137	2
		O2. Benefit for Organization	0.094	4
		O3. Skill and Expertise in Digital Business	0.114	3
		O4. Distribution Channel	0.072	8
		O5. Strategy for Revenue	0.058	10
Environmental (E)	0.228	E1. Partner and Customer Trust	0.086	5
		E2. Customer Satisfaction	0.075	7
		E3. Scalability	0.070	9

Table 4. Rank of Payment Method Collaboration using TOPSIS.

Alternatives	Preference	Rank
E-wallet	0.753	1
PayLater	0.365	3
COD	0.382	2

From a methodological point of view, the scientific authors’ contribution was the combination of AHP and TOPSIS to answer the research questions. This study shows that the combination of AHP and TOPSIS is suitable in identifying the critical factors for consideration in collaborative decision-making between e-commerce companies and partners.

4. Results and Discussion

Analytical hierarchy process (AHP) was used to determine the weight of each collaboration factor between partners and trading companies electronically. In the table above, the priority order for the TOE framework is (1) technology, (2) organization, (3) and environment. The technology framework was assigned a weighting of 0.438 and was a top priority in the assessment. The criterion given the second priority was organization with a weight of 0.334. The criterion with the third priority was the environment with a weight of 0.228, and the overall inconsistency value was 0.164. The inconsistency value > 0.1 indicates the assessment was at the consistency limit. However, the inconsistency value of more than 0.1 (but not too high) could also be accepted as consistent [37].

Among the priority criteria, the top one is networks and partnerships, which are part of the technology framework. Networks allowing cooperation of partners and electronic trading organizations need to be supported by special partner selection procedures. In this position, e-commerce organizations need to develop procedures and have partner criteria standards, so that partner capabilities are in line with organizational expectations.

The second priority is the management’s commitment to the organizational framework. This criterion describes the positive attitude of management towards change as a result of collaboration with other parties. Experts emphasized that support for innovations in collaboration and coordination across units is an essential characteristic of the organization. Cross-unit collaboration needs to be arranged within each organization and partner because ongoing collaboration involves many departments.

The third priority criterion is knowledge and skills in digital business in the organizational framework. In a collaboration program, these criteria are implemented before collaborating with partners through in-depth research on potential partners. Research that can be done on potential partners includes partner business processes, performance and partner programs already running, and partnerships between potential partners and other partners.

The fourth priority criterion is the benefit to the organization that is part of the organizational framework. Collaboration has a wide range of measurable benefits, starting with nominal income and benefits for employees in the organization and business development. To increase benefits to both companies, collaborative education plays a vital role in distributing benefits to all organization members.

The fifth priority criterion is the trust of partners and customers who are part of the environmental framework. This environmental framework is an external factor obtained from the assessment of partners and customers and is an after-sales service that influences future market opportunities. Partners also need to demonstrate a quality assurance system of work carried out during the collaboration and continuous performance.

The sixth priority criterion is the technology readiness of the technology framework. This describes technological optimism, organizational innovation and safety, and convenience in using technology in collaborative programs.

The seventh priority criterion is customer satisfaction as part of the environmental framework. This criterion is obtained from business services that influence customer opinion and lead to future purchases. This criterion depicts the quality and value of a product to customers, including customer service and organizational commitment to customer satisfaction.

The eighth priority criterion is the distribution channel of the organizational framework. Distribution channels need to be utilized to allocate profits by ensuring the flow of information, goods, and money runs according to procedures agreed by both parties. Approval in service response in the form of work time of partners devoted to the organization is also a tool to measure the performance of distribution channel accuracy.

The ninth priority criterion is the scalability of the environmental framework. The scalability of the collaboration can define a new market segment for e-commerce services. Partners need to have a national network and a growing number of users.

The tenth criterion is the strategy for the revenue of the organizational framework. This criterion is a way to obtain optimal income with strategies from both parties. Both parties are required to identify potential income, potential losses, and set strategies to scale up the service.

The eleventh criterion is the data security system of the technology framework. Organizations need to manage electronic trading customer protection methods and credentials for each organization regulated in a particular policy or procedure.

The case study was carried out in the selection of payment methods at PT CI, a B2B SaaS E-commerce platform in Indonesia. In the case of selecting the payment method, PT CI needed to determine the addition of payment methods according to business needs as well as customer needs. The available payment method options were e-wallet, COD, and PayLater based on the TOPSIS method; sequentially, the highest weighted was the addition of the e-wallet payment method. The high weight was because, with various e-wallet providers, more and more customers have more than one e-wallet. The choice of collaboration with e-wallet providers can be a top priority for future business development.

The second priority was a COD or onsite payment method when the goods are delivered to the customer. COD requires collaboration not only with payment providers but also courier providers. The third priority was PayLater, which is the last choice as a strategy to develop business.

5. Conclusions

The criteria of the TOE framework refer to technology, the organization, and the environment. The order of priority frameworks in the collaboration program based on this research are (1) technology, (2) organization, and (3) environment.

Based on the identified criteria against the existing framework, the first criterion that becomes a critical factor is (1) networks and cooperation. This critical factor is followed by (2) management commitment, (3) knowledge and expertise in digital business, (4) benefit to the organization, (5) partner and customer trust, (6) technology readiness, (7) customer

satisfaction, (8) and distribution channel. The three factors that are considered less critical are (9) scalability, (10) entry strategy, and (11) data security system.

In applying the TOE framework and the 11 criteria in a case study of payment method selection, the main priority was the provision of e-wallet payment methods, which can be done by adding service providers. The second priority was the procurement of an onsite payment method (COD), with the PayLater payment method being the third priority.

The TOE framework limits the criteria specified in this study. Future research can expand the scope of criteria outside the TOE framework, such as the customer and partner frameworks. The use of AHP and TOPSIS can be developed to select other collaborative programs in electronic trading organizations; for example, such as delivery service collaboration programs, warehousing service collaboration, or marketing partner collaboration.

Based on the results of previous studies and the results and analysis presented in this paper, the theoretical implications of this research are the ranking of the framework as a priority in determining collaboration between electronic commerce organizations and partners from the perspective of the organization, with the object being studied the selection of payment methods.

Several prior research projects on e-commerce companies have concentrated on business adoption and strategy. In practice, determining collaboration in electronic commerce groups is intuitive and does not completely account for technological, organizational, and environmental frameworks. The findings of this study's priority framework and variables may be utilized to make judgments about the new payment method that will be employed by the organization for the growth of an electronic trading firm.

This research was limited to a focus on priorities for e-commerce collaboration. For future studies, it is suggested to use other MCDM methods as they might complete the results presented in this paper. Additionally, future studies could be developed to select other collaborative programs or develop a collaborative strategy framework.

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