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Collaborative Commerce Model for SMEs: A Knowledge and Resources Sharing Mechanism for Co-Creation

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ABSTRACT

As a response to the severe impact of the COVID-19 pandemic, Small and Medium-sized Enterprises (SMEs) must collaborate and work together; namely, using collaborative commerce (c-commerce). To some extent, SMEs have taken advantage of various web, e-marketplace, and social media resources to collaborate in their business activities. However, this only occurs to a partial extent. Consequently, a study was conducted to build a conceptual model of c-commerce for SMEs, for use as a standard in these collaborative activities. Data collection was performed through in-depth interviews, observation, and literature reviews. The sample selection was done via purposive sampling; specifically, SMEs' fashion products with high personalisation and good production quality. The conceptual model of c-commerce is based on the Soft Systems Methodology (SSM), a suitable method for building models for new and complex ecosystems. The conceptual model is compared with a rich picture and then analysed. The final result of the conceptual model is employed to construct a c-commerce system for SMEs in creating joint products and sharing resources with their stakeholders.

Keywords: Collaborative commerce; Co-Creation; Knowledge management; COVID-19

1. INTRODUCTION

The emergence of COVID-19 has reduced direct interaction between SMEs in running their businesses, and impacts consumption patterns and how people spend, from initial conventional switching to online shopping. Most SMEs also face logistical challenges due to reduced demand and disruption of transportation[1]. SMEs have become the most vulnerable businesses, so when the market declines drastically, there will be disruptions to the company's cash flow[2]. As a response to the extreme impact of this pandemic, SMEs are required to optimise information technology (IT) in maintaining their activities[3]. This allows SMEs to conduct transactions and manage their knowledge as an aspect of innovation. This condition is known as digital resilience, where one of the components is collaboration[4]. With collaboration, organisations can work together to complete work or share information and resources that are not owned internally[5]. The adoption of a paradigm of collaborative commerce (c-commerce) is becoming relevant in maintaining a competitive advantage during the pandemic.

The industry segment most widely used in c-commerce research is large enterprises and manufacturing,[6] and this has not provided much discussion of SMEs. However, SMEs are a business segment with an excellent opportunity to implement c-commerce. Smaller organisation size allows SMEs to make decisions more quickly and run their business processes more effectively. Current research on c-commerce tends to discuss the factors that influence the success of inter-organisational relationships with several theoretical approaches,[6–9] but lacks focus on the implementation stages. The initial implementation phase is to develop a conceptual model of c-commerce for SMEs. This model is essential before a collaboration platform is built to make c-commerce a reality. However, creating a c-commerce model is not an easy task. The developer must systematically reassess the norms that guide the design and maintenance of the c-commerce system. This study aims to build a conceptual model of c-commerce for SMEs for use as a standard in collaborative activities. These collaborative activities will open up opportunities for SMEs to innovate and increase their competitive advantage. This research is an important endeavor, as the conceptual model of c-commerce for SMEs will provide a clear picture of how transactions and exchange of ideas and knowledge occur.

2. C-COMMERCE AND CO-CREATION

C-commerce is a paradigm in which business stakeholders interact through the Internet and related integration technologies following their core competencies. C-commerce refers to electronic support for business collaboration, enabling companies to collaboratively plan, design, develop, manage, innovate, and research products, services, and business processes[10]. C-commerce refers to online activities and communications carried out by parties working to achieve

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the same goals, such as creating new products[11]. C-commerce also combines e-commerce, knowledge management, and collaboration to carry out transactions and other activities within and across organisations[12].

C-commerce supports creating new value together with consumers in developing a product. This is known as co-creation and gives maximum opportunities for consumers to be actively involved in product development through interactions facilitated by technology[13]. This concept shows a shift in perspective from a business model that was originally only a mere value creation tool to a business model that enables relationships between stakeholders and value systems[14].

3. RESEARCH METHODOLOGY

3.1 Data Collection

The research subject is SMEs that sell fashion products because this type of SME is suitable for implementing product personalisation with the concept of co-creation. The production process at these SMEs is often a home product with high personalisation and good production quality. The co-creation concept emphasizes that the value of a product results from shared thoughts between business owners, customers, and business partners. This process results in a mutually beneficial relationship. The business owner gains a competitive advantage, reputation, and brand value from the jointly produced products[15]. Service to customers becomes more efficient and personalised and can be tailored to customer needs, usage situations, and behavior[16]. The sample selection used purposive sampling. The selected SMEs had operated their business for at least five years and actively participated in various exhibitions and other collaborative activities. The selected SMEs also have unique designs and motifs, good taste, and good-quality products. The raw material was traditional fabrics such as batik or weaving.

A research process with a qualitative approach is carried out in real situations. Data collection is explored using a conceptual framework, interview techniques, and observation. The interview process aims to identify the problem before and after the pandemic. The Researchers obtained precise information that follows stakeholders' behavior, related parties, and the flow of information within the scope of the research. The knowledge gained at this stage becomes input in developing a c-commerce conceptual model with a broad perspective for SMEs with similar products.

Primary data was obtained through in-depth interviews using a semi-structured model with open-ended questions and was only used for research purposes. Discussions were limited to 2 people per day and carried out for three days (6 participants). Interviews were conducted in an informal setting so that SME owners felt comfortable and could answer questions openly. Secondary data was obtained using literature reviews to develop the hypothesis that there is currently no c-commerce model for SMEs. To ensure the validity and reliability of qualitative data collection and to overcome biased interpretations, the researchers conducted a triangulation model, which compared interview data with observational data and the results of literature reviews.

3.2 Soft System Methodology

One of the research methods used for c-commerce is technology stages, including building a conceptual model[6]. The conceptual model represents a system used to assist developers in understanding or simulating a subject. A conceptual model is a duplication of the real world or an abstraction from a system of activities that has a meaning relevant to the real world that is considered problematic. The conceptual model is not a representation of the real world, but the conceptual model is a duplicate of the real world[17].

The conceptual model of c-commerce is built with an SSM approach. SSM is a methodology for analysing and modeling systems that integrate technology (hard) and humans (soft) to solve complex problems related to humans[17]. Compared with a Hard System Methodology (HSM), which can only provide the problem solution, SSM does not limit the existing difficulties and identifies many variables that interact in the system. SSM is regarded as the correct methodology in understanding the complex, irregular, and not well-structured real world. A complex issue such as coping with a pandemic often has a longer time scale and many interdependent factors, so it becomes more complicated and has a high level of uncertainty[18]. In such circumstances, it is advantageous to use SSM rather than the more rigid HSM approach.

Checkland defines seven stages in SSM, which is also known as the Checkland protocol[17]. The protocol includes:

- Identifying problems,
- Building a rich picture,
- Defining CATWOE (clients or customers, actors, transformations, worldview, owner, and environment),
- Designing a conceptual model,
- Making comparisons between the real world and the conceptual model,
- Defining possible changes, and
- Taking corrective action.

During the research process, it is possible to find new problems. An indication of a problem can stop the flow of information while obtaining information. When the data cannot be obtained, it is necessary to conduct an assessment as soon as possible to derive an appropriate c-commerce model.

4. RESULTS

4.1 Problem Identification

Interviews were conducted to identify problem situations and to provide an accurate picture of SMEs' business processes before and after the pandemic. These interviews also included factual information that follows stakeholders' behavior, related parties, and the flow of information.

4.2 C-Commerce Rich Picture

A rich picture represents the information exchange between SMEs and stakeholders by using photographs (Fig. 1). The rich picture is a basic guideline for the interactions of people, objects, processes, structures, elements, and problems in SMEs' c-commerce ecosystem in the situation before and after the pandemic. COVID-19 also changes customer behaviour patterns concerning shopping. In the current environment,

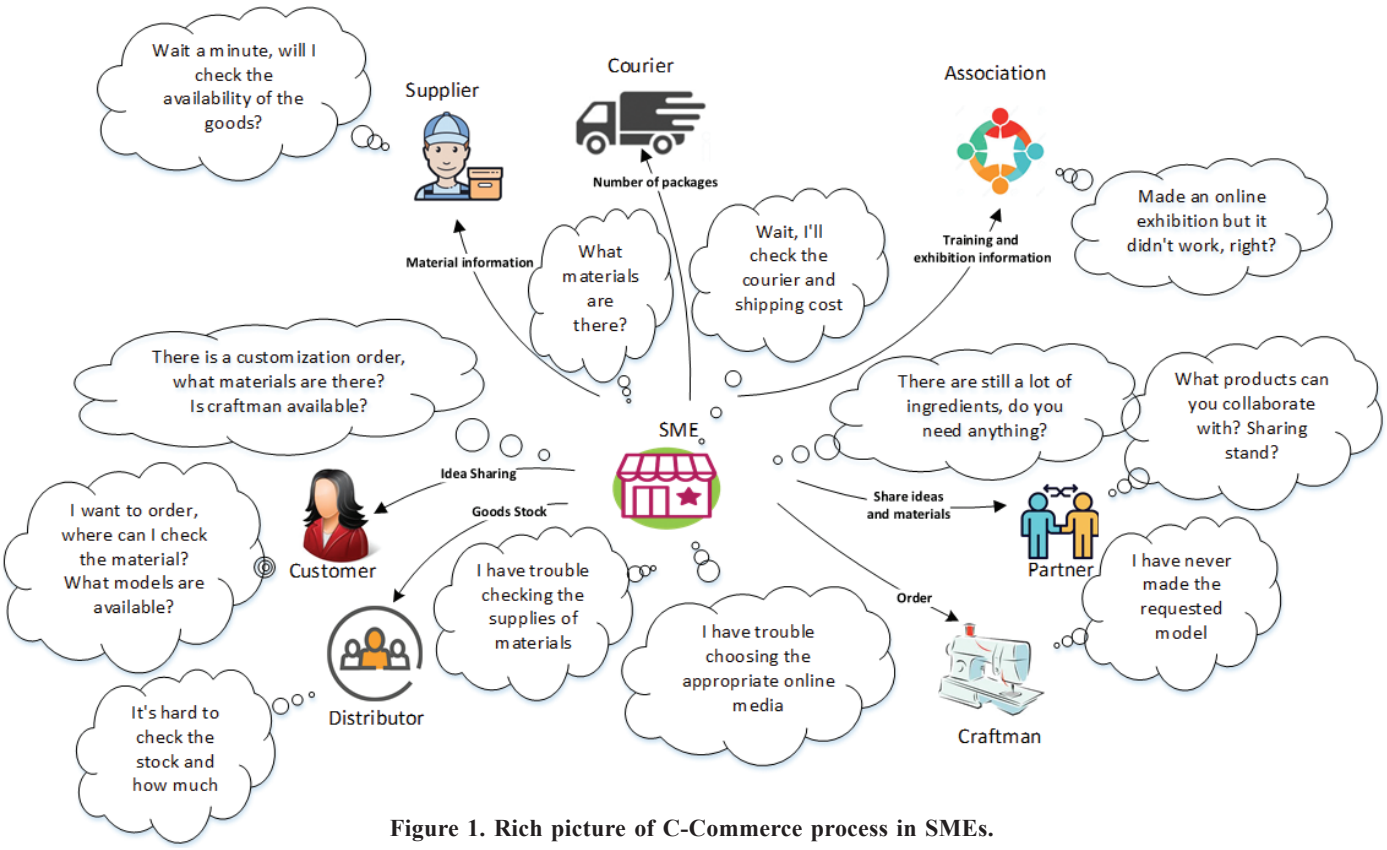

Figure 1. Rich picture of C-Commerce process in SMEs.

Table 1. CATWOE

Element	Definition	Description
Customer	People who receive the benefits or consequences of the transformation process.	Customers, distributors
Actor	People who carry out the transformation process.	Owner, partner, supplier
Transformation	Conversion from input to output.	The idea is transformed into a pattern and change in goods.
Worldview	The perspective that makes transformation meaningful.	C-commerce model to add value in designing, producing, and distributing products, sharing information and knowledge while promoting trust between parties.
Owner	The person/group that is responsible for the transformation.	Owner, customer, partner, supplier
Environment	The environment outside the given system.	Supply chain, customer relationships, and internal processes

fashion products are no longer a top priority, so SMEs find it challenging to map new models and types of fashion. Before the pandemic, if orders of goods in large quantities exceeded their internal production capacity, SMEs would share the order with other trusted SMEs. After the pandemic occurred, SMEs experienced an excess stock of goods and raw materials when orders dropped drastically.

4.3 Root Definition

The "root definition" is a system to do X, by (means of) Y to do Z. In terms of X, Y, and Z, the following can be stated: X: what the system does, Y: how it is, and Z: why it is done. The root definition for c-commerce can be formulated as follows:

"SMEs can collaborate on designs with customers and other business partners, get information on raw material inventory and readily conduct transactions, report on the availability of finished goods to prospective customers, and send goods quickly (X); through an electronic c-commerce system that integrates stakeholders by prioritizing trust between the parties involved (Y); to increase the competitive advantage of SMEs, update the availability of raw goods, design products according to customer wishes, and maximise production and delivery speed (Z)."

The researchers compiled a conceptual model based on the root definition, refined by CATWOE analysis and 5Es (efficacy, efficiency, effectiveness, ethics, and elegance) for transformation[17–19]. CATWOE analysis helps reduce complex situations into key relevant ones. The CATWOE shows who gains or loses due to conversion, who does the conversion, changes from input to output, viewpoints, who owns change

Table 2. 5Es performance

Performance measurement	Definition	Description
Efficacy	Does the transformation represented by the activity produce an output?	Will the c-commerce model enhance SMEs' collaboration by sharing information and protecting sensitive information?
Efficiency	Are the minimum resources used to obtain the results of the transformation process?	Will the c-commerce model maximise IT as a platform for information exchange?
Effectiveness	Does the transformation meet the long-term goals proposed in the worldview?	Is the c-commerce model used to share information to design, produce, and deliver goods faster and better?
Ethics	Has the transformation been carried out morally?	Will the c-commerce model maximise IT to share information while maintaining trust between the parties involved?
Elegance	Did this transformation work in an elegant manner?	Will the e-commerce model be flexibly implemented?

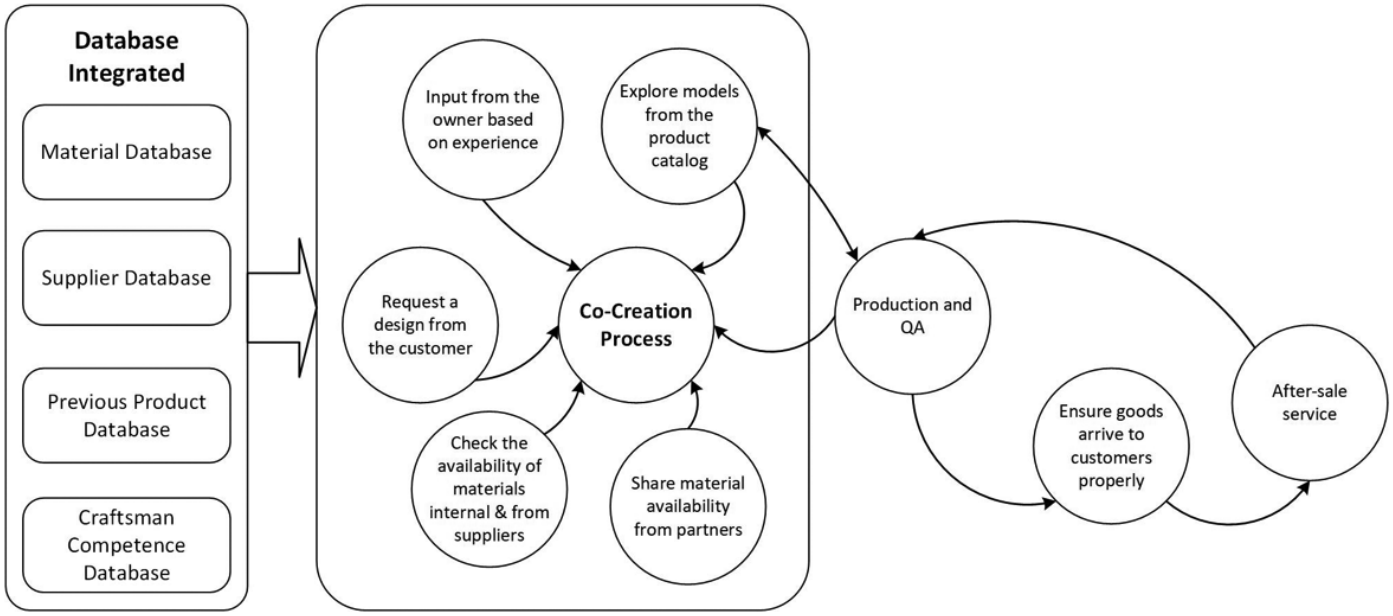

Figure 2. Conceptual model of C-Commerce for Co-Creation process.

activities, and environmental constraints in the c-commerce ecosystem in SMEs (Table 1).

The 5Es index in Table 2 is a criterion used to define and monitor system performance as represented by activity in the c-commerce ecosystem. With this 5Es approach, it will be demonstrated that the conceptual model produced will suit the needs of c-commerce in SMEs.

4.4 Conceptual Model

The researchers have included ideas in compiling a conceptual model to provide an overview of specific structures and the basic theory. This conceptual model will represent certain situations and conditions that contain several human activity systems.

4.5 Comparing Conceptual Models with Real Life

This c-commerce conceptual model is an artificial tool based on an ideal perspective (a progressive worldview). However, the real world is coloured with various constantly changing viewpoints, and these changes can be slow or fast[19]. The researchers compared the conceptual model with real-world situations based on the previous rich picture. Table 3 contains the business processes for the c-commerce conceptual model and is equipped with a measurement scale. The model evaluation table ensures all the proposed business processes are relevant to operate.

4.6 Changes According to the Actor's Interests

This stage aims to improve the c-commerce conceptual model into a desirable system with various logical considerations in a refined manner (Table 4). Improvements are made based on comparisons and discussions that have been undertaken beforehand. If aspects of the c-commerce model are deemed inappropriate by the "Actor" or "Owner," changes in actions or activities to the model will be carried out. These changes represent rethinking to create a c-commerce model that can be operated in a predetermined target environment; namely, the c-commerce model between SMEs and stakeholders involved in running business processes.

4.7 Implementation Model and Recommendation

SSM is a continuous learning process. Therefore, it can be repeated as a constant learning effort to deal with new obstacles. Consequently, new iterations will revise the previous model.

Table 3. Evaluation matrix of C-Commerce

Activities Model	Existed/ Did Not Exist	How?	Who?	Measure of Performance
Co-creation process through the system.	Did Not Exist	Collaboration utilises systems to access information/knowledge and communicate between stakeholders.	Owner, customer, supplier, partner	Information and knowledge availability. Delivery accuracy. Raw material quality.
Produce goods according to the design results.	Existed	Production is conducted following the design that has been made. There may be a re-design when the pattern or sample does not turn out as expected.	Owner	On-time production. QA.
Input from the owner based on experience through the system.	Did Not Exist	The owner's knowledge of the characteristics of suitable materials considers whether the proposed product can be realized or not.	Owner	Quality of previous product.
Request a design from the customer through the system.	Did Not Exist	Adapt offerings to customers' usage situations, unique needs, and behavior.	Customer	Co-created product.
Check the availability of materials internally and from suppliers through the system.	Did Not Exist	Integrated internal database and suppliers for the availability of materials according to customer requests.	Owner, supplier	Fast response. Update availability at any time.
Share material availability from partners through the system.	Did Not Exist	Material requirements, knowledge related to products and production, and the availability of artisans can be obtained from partners who collaborate.	Owner, partner	Material availability Sharing knowledge. Sharing resources.
After-sale service	Existed	Receive repair requests, complaints, and product reviews from customers.	Owner, customer	Number of repair requests. Number of complaints. Customer review.

Table 4. Conceptual model testing results

Activities	Desirable	Feasible	Input
Co-creation process through the system.	Yes	Yes	Information and knowledge, cooperation and communication, customer, supplier, and partner.
Produce goods according to the design results.	Yes	Yes	Production is running according to order, and quality is guaranteed.
Input from the owner based on experience through the system.	Yes	Yes	The experience and expertise of business owners becomes valuable knowledge.
Request a design from the customer through the system.	Yes	Yes	Customer preferences, materials availability, materials characteristics, and competencies.
Check the availability of materials internally and from suppliers through the system.	Yes	Yes	Database that is integrated with suppliers to check availability quickly.
Share material availability from partners through the system.	Yes	Yes	Collaboration can only be carried out on the principle of trust between SMEs so that potential partners' reputation is considered in the partnership.
After-sale service	Yes	Yes	Features as easy as possible to use, set up notifications automatically.

The SSM approach focuses on process modeling, identifying unstructured problems, and identifying problem solutions that are not clear with a holistic view[20]. It also tries to capture the perception of a situation from the researcher's perspective[21]. In particular, the SSM approach provides more precise possibilities for capturing the changes required for the current c-commerce system to be transformed into one that meets future user requirements[20]. The use of SSM can be seen as a preliminary activity in defining requirements for building a c-commerce system's main components, including system boundaries. However, the informal models generated from SSM are not sufficient as a basis for implementing an information system. A system may be technically and economically feasible from the perspective of a hard system, but may not necessarily be

acceptable for other reasons in the context of soft systems[22]. Hence, a formal hard system modeling approach such as UML (Unified Modeling Language) is needed to determine the detailed technical form, proper function of various system components, and interfaces in the system.

In a c-commerce system design for SMEs, c-commerce can be carried out using synchronous or asynchronous communication models. The 3C model approach describes the SMEs' c-commerce collaboration mechanism: communication, coordination, and cooperation[23-26]. Communication plays a vital role in electronic collaboration to exchange thoughts, ideas, information, knowledge, and ongoing commerce processes. The communication process starts with the customer communicating with the SMEs, and then continues to relevant stakeholders such as partners, suppliers, and artisans. Ongoing communication will create a coordination mechanism among parties in accordance with their respective duties and functions[23-26]. C-commerce requires coordination mechanisms to ensure successful collaboration, such as a workflow system between members. The coordination mechanism is relatively flexible and adjusts interaction dynamics between members to avoid conflict. Good coordination enables the respective stage of c-commerce to be fulfilled by meeting the targets of specifications, criteria, and agreed processing and delivery times. The c-commerce system also creates a coordinated and shared virtual workspace or environment to complete tasks. It enables cooperation among actors, who greatly influence each other's performance in understanding and communicating orders, and enables the coordination of information for collaboration to produce orders[23-26].

5. DISCUSSION

C-commerce is an extended form of e-commerce and collaboration in the supply chain. It focuses on monetary transactions and includes exchanging information and ideas between organisations[10]. C-commerce is a set of technologies and business practices that enable companies to build stronger relationships with partners through integrating complex, cross-company processes governed by business logic, rules, and workflows[11]. In c-commerce, activities align the operations carried out in the supply chain, and create success indicators for customers and stakeholders rather than for individual actions. An attempt is made to implement this concept in the SME business context to maintain long-term business relationships and find solutions to problems faced together during the pandemic. C-commerce also provides an opportunity to explore more deeply the values held by customers and stakeholders via shared value creation through collaboration, in the form of sharing ideas and knowledge, based on the principle of trust among system users[28].

Topics involving SMEs and using the SSM methodology are primarily addressed with a cluster approach. Clusters are geographic concentrations that connect many business owners, suppliers, service businesses, supporting industries, and institutions related to specific aspects of competition and cooperation[21]. However, the collaboration model proposed in c-commerce makes geographic concentration irrelevant because collaboration can be done electronically and accommodate worldwide potential buyers. The c-commerce model also provides value for SMEs with respect to increasing market share and finding new markets,[29] and to adapting when the environment changes in crisis conditions. The context of c-commerce is a network of partnerships or strategic alliances that SMEs can use in dealing with conflicting threats in a dynamic and complex business environment[30]. Early adopters of the c-commerce model can immediately leverage strategic advantages by forming c-commerce alliances.

The communication model of businesses has shifted. The previously more vertical or bottom-up model has been replaced by dialogue between equal partners[31]. As a theoretical construct, co-creation reflects a collaborative and interactive process[32-33]. SMEs in the fashion industry will achieve better business performance if they are oriented towards innovative strategic practices[34]. Value, both economic and non-economic, will be created through collaboration. Economic value is related to financial benefits. Non-economic value, for example, is connected to obtaining information and knowledge from other collaboration members[35]. C-commerce activities involve information sharing and integration of resources in realising a shared value creation process among collaboration members[36-37]. An additional driving factor for co-creation is social influence[16]. In terms of long-term collaboration planning, co-creation activities can enable product diversity and involve customers by offering tailor-made products and supporting user-generated content[38]. This will accommodate shared value creation by involving customers[16].

6. CONCLUSION

This study develops a conceptual model of c-commerce using SSM and discusses opportunities and recommendations for implementing the model. SSM can capture various problems in information systems design. This includes the computing side, the organisation, and business processes in providing the required solutions. C-commerce uses digital technology that enables SMEs to design, develop, manage, and research innovations for products, services, and applications with their stakeholders. This concept is suitable if applied in the SME business context to maintain long-term business relationships and collaborations and face a changing environment.

The first limitation of the research is the scope of the study, as the conceptual model is built from the perspective of SMEs only, which may not represent the overall picture of the c-commerce ecosystem. Interviews have not been conducted with all stakeholders in the c-commerce system. The problem situation described is only based on interviews from the SMEs' point of view. The second limitation is that in the seven stages of SSM, the conceptual model will be compared with field conditions, allowing for changes. However, the results of this conceptual model are only compared through one iteration using a rich picture. Future research can undertake several iterations until a model that matches reality is derived.

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Contributions in the current study are research framework, methodology, data collection, analysis, and writing.

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