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**Title:** Information Technology–Supported value Co-Creation and Co-Destruction via social interaction and resource integration in service systems

**Year:** 2022

**Version:** Published version

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**Please cite the original version:**

Li, M., & Tuunanen, T. (2022). Information Technology–Supported value Co-Creation and Co-Destruction via social interaction and resource integration in service systems. *Journal of Strategic Information Systems*, 31(2), Article 101719. <https://doi.org/10.1016/j.jsis.2022.101719>



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## Journal of Strategic Information Systems

journal homepage: [www.elsevier.com/locate/jsis](http://www.elsevier.com/locate/jsis)

# Information Technology–Supported value Co-Creation and Co-Destruction via social interaction and resource integration in service systems

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## ARTICLE INFO

## Keywords:

Value co-creation  
Value co-destruction  
Service system  
Social interaction  
Resource integration  
Information technology

## ABSTRACT

The paper develops a conceptual framework to study the constructs of information technology (IT)-supported value co-creation and co-destruction through shared processes of social interaction and resource integration as mediated by IT and embedded in interactive value formation practices. In particular, the elements of social interaction and resource integration are identified, and the role of IT is discussed. We conduct a systematic literature review and analyze the data using the service system perspective. Our research contributes by identifying the constructs of value-creating phenomena enabled by IT from the service system perspective and presenting a research agenda for further studies.

## Introduction

Value co-creation (VCC) is getting increasing attention for organizations seeking competitive advantages. By successfully managing the VCC, organizations can improve their market performance, strengthen their relationships with stakeholders, improve productivity and efficiency, reduce costs and risk failure (Payne et al., 2008; Roser et al., 2013). To better benefit from VCC, it is essential to understand how the co-creation takes place and affects various engagers. The service systems perspective offers a great foundation for analysis as it centers on the participants, processes, resources that interact to co-create value (Vargo et al., 2008).

Service systems are “value co-creation configurations of people, technology, value propositions connecting internal and external service systems, and shared information” (Akaka & Vargo, 2014, p. 368). Furthermore, the literature adopts the term actor to describe those involved in service systems, engage in the collaboration process, and contribute to creating value for themselves and others (Vargo et al., 2008). Compared with a singular entity-level perspective that focuses on actors like service providers or customers only, the service system perspective tends to have more explanatory power (Breidbach & Maglio, 2016) as it offers an overview of the networks and the connections among different service systems. Any singular entity-level perspective can be integrated into service systems through value propositions if connected with other service systems. Therefore, service systems are an ideal unit of analysis and provide systemic perspectives for studying VCC (Breidbach & Maglio, 2016).

LEGO company’s way of involving their customers is an example of VCC in a service system. LEGO provides a community where customers, as the service system actors, can contribute ideas for the brand’s new model, vote and comment on others’ ideas (Fagerström et al., 2020). LEGO is an actor in this service system, and they provide the technology and shared information to enable

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<https://doi.org/10.1016/j.jsis.2022.101719>

Available online 18 May 2022

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VCC. After the ideation, voting, and commenting, the resulting customer ideas with high levels of supporters will be launched by LEGO (Fagerström et al., 2020). This saves time and money in market research for the company but also strengthens their customer loyalty. The customers, in turn, are more empowered to influence the company's product development choices through VCC.

However, despite a large amount of research on VCC, there are apparent research gaps: (1) no research studies VCC and its destructive side (value co-destruction, VCD) simultaneously in service systems; (2) the role of IT in VCC and VCD within service systems remains largely unexplored although its importance has been acknowledged; (3) The definitions of VCC and VCD appears to be incongruent as generated from different perspectives and contexts; (4) resource integration and social interaction, being acknowledged as the main processes leading to VCC and VCD, has not been studied together in IT-supported environment.

As value is "perceived and determined by the customer on the basis of value-in-use" (Vargo & Lusch, 2004, p. 7), the destructive side of value-in-use should not be underestimated (Cabiddu et al., 2019). VCC and VCD are integral parts of interactions and key dimensions of interactive value formation (Echeverri & Skålén, 2011). Likewise, some authors (Chowdhury et al., 2016; Vartiainen & Tuunanen, 2014) argue that VCC and VCD are linked and cannot exist independently in the context of creating value. However, most previous studies have focused on VCC, and research examining VCD is scarce (Chowdhury et al., 2016), let alone that studying both. Unboxing VCC, VCD, and their interconnection might facilitate in discovering what and how relevant factors create or destroy value and provide valuable insights to organizations for making strategic decisions about involving actors in co-creation activities. Considering the possibility of VCD offers a critical understanding of value formation as collaboration does not always result in VCC. Besides, studying VCC and VCD together in a service system can facilitate the understanding of coordinated interactions and relationships, revealing the transition mechanisms between VCC and VCD and the governance mechanisms within the service system.

As an essential element of service systems, information technology (IT) and its role in service value contribute to the continuous integration of resources to create new forms of innovation for value creation (Hsiao et al., 2019). Recent research indicates that advancements in IT not only expand collaboration opportunities to co-create value (Böhmman et al., 2014) but may also result in value co-destruction (VCD). For instance, the use of like functions of crowdsourcing communities can intrinsically motivate contestants. Nonetheless, their excessive use among befriended contestants can potentially threaten platform providers' business models, resulting in VCD (Faulant & Dolfus, 2017). Thus, IT-supported collaboration can yield beneficial and unfavorable outcomes for the actors involved in a service system (Faulant & Dolfus, 2017; Plé & Cáceres, 2010). However, although the importance of IT has been recognized, IT-enabled VCC and VCD remain neglected in the literature (Breibach & Maglio, 2016; Sarker et al., 2012). In particular, it is unclear which activities and processes are relevant for the emergence of value (Akaka & Chandler, 2011), and the impact of IT on VCC and VCD remains a key challenge for current research (Breibach & Maglio, 2016). Multiple studies have called for more in-depth research on IT-supported VCC and VCD (Böhmman et al., 2014; Breibach & Maglio, 2016; Lusch & Nambisan, 2015). Therefore, a joint analysis of IT-supported VCC and VCD is needed, which is scarce in the literature.

VCC and VCD have various definitions from different perspectives. McColl-Kennedy et al. (2012) defined VCC as "benefit realized from integration of resources through activities and interactions with collaborators in the customer's service network" (p. 375). Russo-Spena (2012) proposed that VCC is "a process in which social and technological resources are integrated" (p. 546). Similarly, VCD is defined as the collaborative destruction or diminishment of value by providers and customers during interaction (Echeverri & Skålén, 2011) that can happen due to failed resource integration (Järvi et al., 2018). Plé and Cáceres (2010) conceptualized VCD as "an interactional process between service systems that results in a decline in at least one of the systems' well-being" (p. 431). These definitions are incongruent as provided in different contexts: VCC and VCD are sometimes referred to as outcomes and sometimes processes. This might cause confusion owing to different constructs and a lack of clear agreement on the definitions. Construct clarity is needed when studying VCC and VCD together within the same service system to provide the research community with a common language (Suddaby, 2010). Therefore, VCC and VCD should be redefined with clear constructs indicating the embedded building blocks and their connections when studied simultaneously in a service system.

Despite the different perspectives of conceptualization, these definitions recognize resource integration and social interaction as the key processes leading to both VCC and VCD. Resource integration offers a unique view on product/service use by shifting the focus from utilizing one firm's single offering to how such offerings can be applied by combing various other resources (Vargo & Lusch, 2004). Resource integration allows intended, unintended, or negative value to emerge, depending on the alignment or misalignment of practices within the network (Caridà et al., 2018). Therefore, successful resource integration contributes to VCC, whereas VCD is triggered by failed resource integration (Smith, 2013). Moreover, multiple actors always co-created value, implying that value is interactional (Vargo & Lusch, 2016). VCC is inherently a social process requiring social interaction—although VCD notably also occurs during social interaction when incongruent elements of practice and unexpected behaviors occur (Quach & Thaichon, 2017). Resource integration and social interaction are also arguably interdependent and dynamic in value formation within a service system (Akaka et al., 2012). To study the value formation process, such perspectives necessitate discussing social interaction and resource integration simultaneously in a broader context of networks and relationships (Gummesson & Mele, 2010). However, little light has been shed on how actors engage in resource integration and social interaction in traditional contexts, let alone IT-supported ones. More specifically, social interaction and resource integration elements that affect interactions and how IT integrates resources (Cabiddu et al., 2019) are still unclear. Addressing this research gap is important, as the underlying elements of social interaction and resource integration can provide practical and actionable insights for managers when planning and developing IT tools and platforms for collaboration. VCC and VCD do not happen by chance and could be foreseeable as consequences of actors' ways of interacting and their decisions related to resource integration (Cabiddu et al., 2019). Thus, studying the constructs of IT-supported VCC and VCD via social interaction and resource integration is vital, as they can offer profound insights into the involved actors, activities, and interconnected relationships.

Consequently, our research question is: *How do IT-supported VCC and VCD occur in a service system via social interaction and resource integration?* Our objective is to exam VCC and VCD together in a service system from the perspective of social interaction and resource

**Table 1**  
Defining stage in the literature review process.

Defining stage	Criteria	Reasons & explanations of choices
Fields of research	In the field of marketing, management, and information systems (IS)	VCC and VCD were widely and mainly discussed in those three fields and have led the discussion on this topic.
Publication Year of research	Since 2010	The time limit was set because the concept of VCD was formally introduced in 2010 by Plé and Cáceres (2010), and we aim to study VCC and VCD simultaneously.
Database for searching	ProQuest, Science Direct, and Web of Science	Those databases were considered appropriate sources since they cover a wide range of literature and are frequently used by scholars (e.g., Bakkalbasi et al., 2006; McKeown, 2010).
Quality of research	Listed in the Australian Business Deans' Council (ABDC) list or the Academic Journal Guide (AJG), rank $\geq 2$	ABDC and AJG are widely accepted in academia as measures of scholarly journal quality (Krueger & Shorter, 2019). Consequently, articles not on either the ABDC list or the AJG (rank $\geq 2$ ) would be excluded, which means that some papers would be missed at the cost of selecting good-quality literature for analysis.
Keywords for searching	Value co-creation OR value co-destruction OR value co-destruction) AND (resource integration OR integrate resource OR resource combination OR combine resource OR rebundle resource OR social interaction OR social connection	Researchers use different synonyms for VCC, VCD, resource integration, and social interaction. For instance, some may use the term <i>value co-creation</i> instead of <i>value co-creation</i> and replace <i>resource integration</i> with <i>resource combination</i> . <i>Social connections</i> can also be used to indicate <i>social interactions</i> .
Criteria for inclusion and/or exclusion	1) The research must focus on studying VCC and/or VCD, meaning that the main idea should be related to VCC/VCD. 2) Satisfying 1), the research must discuss resource integration and/or social interaction.3) Satisfying 1) and 2), articles should be included if they discuss IT-related issues, such as (but not limited to) IS/IT artifacts, online platforms/communities, artificial intelligence (AI), etc. 4) Satisfying 1) and 2) articles that are not IT-related but contribute to our understanding of the relationships between VCC and VCD, i.e., articles simultaneously discussing VCC and VCD should be included.	The inclusion criteria are defined based on our defined research questions and the aims of the paper.

integration, explore the role of IT and the elements of social interaction and resource integration, and redefine VCC and VCD in service systems with clear and congruent constructs. Our study will approach the research question by synthesizing and analyzing relevant previous research, and it is based on the service systems perspective.

## Methodology

This study adopts Wolfswinkel et al.'s (2013) five-stage grounded theory method for reviewing the literature systematically and rigorously: defining (the criteria for inclusion or exclusion), searching (actual navigating the databases), selecting (filtering sample of studies to be reviewed), analyzing (extract genuine value from the chosen articles), and presenting (writing a coherent overview paper). A literature review is an effective methodology to answer our research question since it enables summarizing and analyzing studies on the same topic and provides insights into extending the work (Webster & Watson, 2002). This research does not intend to cover the entirety of the field. Still, it aims to provide a focused and informative evaluation of carefully selected research about IT-supported VCC and VCD from the perspective of resource integration and social interaction.

Table 1 summarizes the criteria and explanations for the *defining stage* in the literature review process.

Fig. 1 presents the *searching and selecting stages*. From three databases, 584 papers were retrieved using the defined keywords, and 112 papers that were not in the field of management, marketing, or IS and not on the ABDC list or AJG mentioned above were excluded. Subsequently, 88 articles were excluded owing to duplication, leaving 384 papers for further checking.

We then checked the titles and abstracts of these papers with the pre-defined criteria for inclusion and exclusion, and 92 articles were included. Next, we assessed the full texts against the same pre-defined criteria for inclusion and exclusion, leaving 81 papers. Then, we went backward by reviewing the citations of the identified articles and went forward by using Google Scholar to identify articles citing the identified articles to find additional relevant articles with the same inclusion criteria. The final analysis included 103 articles (see the online Appendix A for a complete list of the included articles).

In the *analysis stage*, we made descriptive notes about each article in Excel to obtain an overview of all included articles. We used the qualitative data analysis software ATLAS.ti for open, axial, and selective coding (Wolfswinkel et al., 2013). We conceptualized and articulated potentially useful excerpts that may have helped answer our research questions with 958 open codes through open coding. Next, we conducted axial coding by grouping the codes and creating subcategories to find interrelations between them. Last, we conducted selective coding using the "network" function in ATLAS.ti, which facilitates comparing, relating, and linking identified categories. Fig. 2 illustrates the final aggregation of key codes regarding social interaction, resource integration, and IT, showing an example of how relevant concepts were developed. Appendix B shows an overview of the included articles.

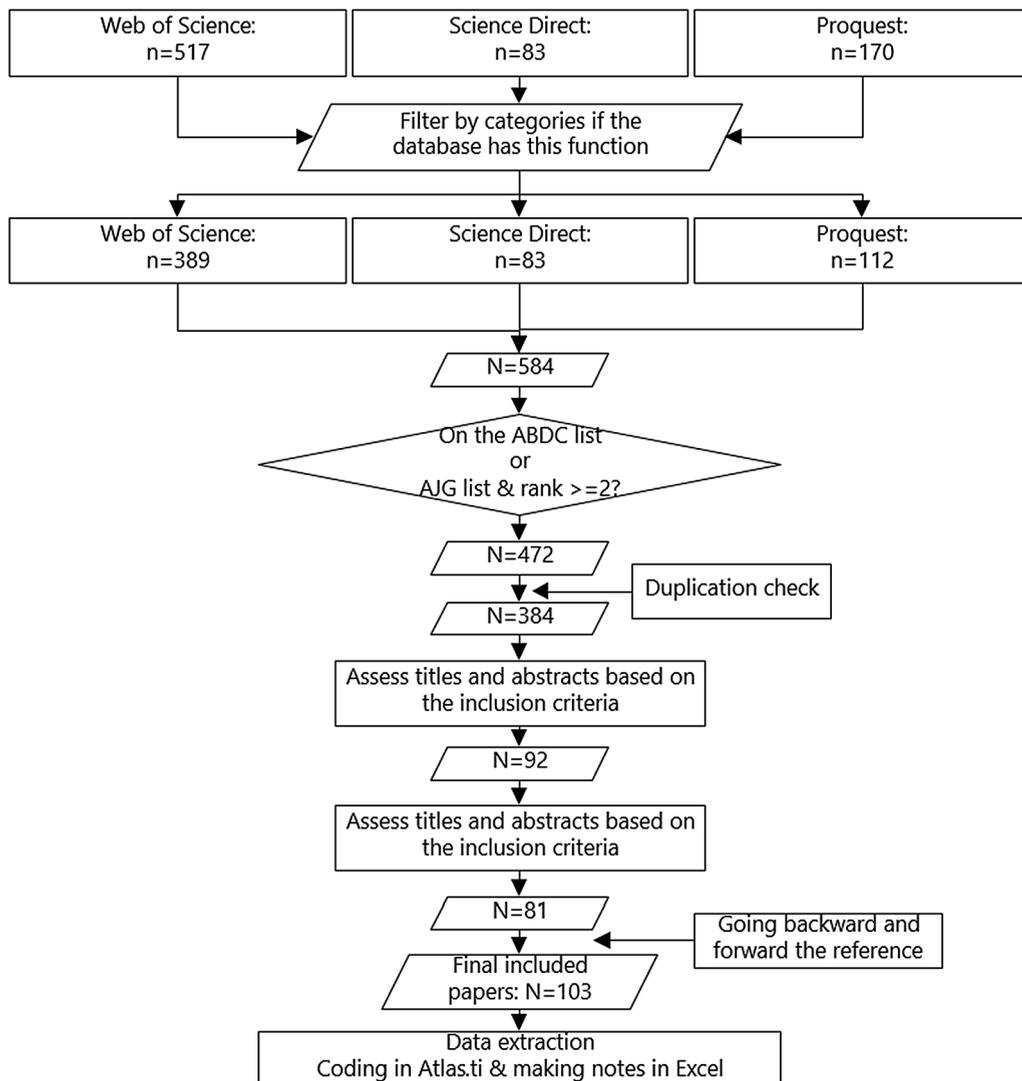


Fig. 1. Searching and selecting stages in the literature review process.

**Findings: A framework of IT-supported VCC and VCD in a service system**

A framework emerged through our literature review (Fig. 3). It depicts that IT-supported VCC and VCD entail both process and outcome. The process includes social interaction and resource integration, which is affected by IT and embedded in VCC and VCD practices. In contrast, the outcome is an increase or decline in at least one of the systems’ well-being, determined by actors in specific contexts. As an antecedent of resource integration, social interaction comprises communication (expectations, shared language/institutions, and communication styles), dialogue, and trust. Access, matching, and resourcing are important elements of resource integration. IT can enable or prevent social interaction and resource integration in various ways, summarized in Fig. 3 and explained in detail in sections 3.2 and 3.4. These processes result in VCC and VCD outcomes that are multidimensional, subjective, and dynamically determined by actors. Table 2 summarizes the definitions and clarifications of the key constructs used in the framework.

The literature illuminates the dual roles of IT as both *operand* and *operant resources* in VCC processes (Lusch & Nambisan, 2015). Technology can be considered an operand resource that requires some action performed on it to have value and an operant resource that can act on other resources (Vargo & Akaka, 2012). IT as an operand resource represents an outcome of human action facilitating the underlying VCC process, with a passive role in enabling resource mixing and matching (Lusch & Nambisan, 2015). For instance, IT is used to build and manage a service ecosystem and search for appropriate resources (Mandrella et al., 2020). Simultaneously, research conceptualizes IT as an operant resource because it “seek[s] out and pursue[s] unique resource integration opportunities on its own, and in the process, engage[s] with (or act[s] upon) other actors” (Lusch & Nambisan, 2015, p. 167). In that sense, IT is proactive in initiating the VCC process and influencing other actors and their behaviors (Mandrella et al., 2020).

The literature defines technology as “a combination of practices, processes, and symbols that fulfill a human purpose” (Akaka and

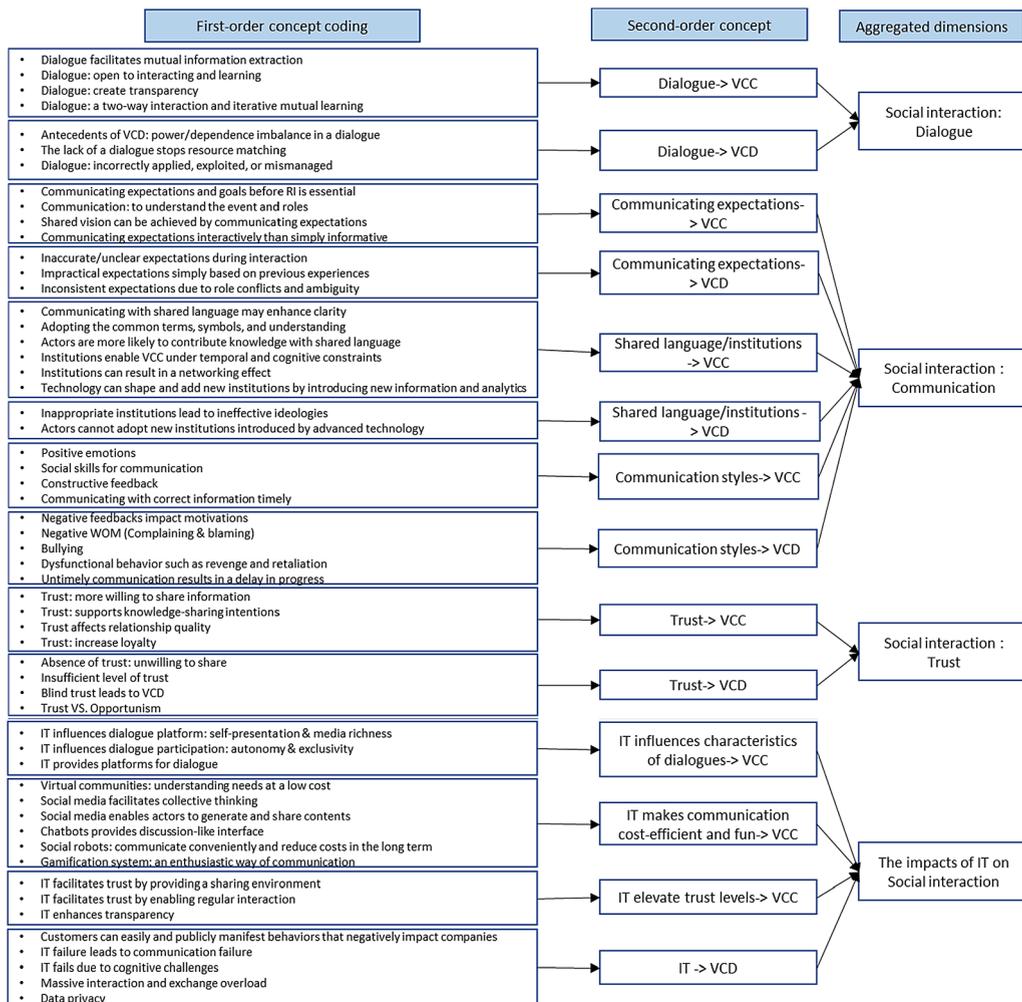


Fig. 2. Final aggregation of the key codes regarding social interaction, resource integration, and IT.

Vargo, 2014, p. 377). Technology can connect operand and operand resources where actors create new technology with their knowledge and skills and then use the new technology to create products or services (Hsiao et al., 2019). Technology, as a process, consequently, does not ensure VCC, implying VCD may also occur. Considering IT as an outcome of human action (resources) and as a process (Vargo & Akaka, 2012) can help better understand VCC and VCD within service systems (Akaka & Vargo, 2014), indicating the functions of IT and how IT impacts the co-creation process.

*Social interaction*

*Social interaction* is a “mutual or reciprocal action where two or more parties have an effect upon one another,” during which “the customers’ and the firms’ value-creation processes are simultaneously occurring” (Grönroos, 2009, p. 14). In other words, social interaction represents two-way or multidirectional communication between actors (Tajvidi et al., 2017).

Based on the synthesis and analysis of literature, three social interaction dimensions were identified that could simultaneously lead to VCC and VCD: communication, dialogue, and trust. Next, how social interaction relates to resource integration and IT’s role in social interaction is discussed.

*Communication*

*Communication* is conceptualized as “an act of transmitting or broadcasting content by an organization that is meant to inform an audience” (Abeza et al., 2020, p. 473). As the core of social interaction, communication is vital for transferring information between actors, allowing understanding others’ thoughts and feelings to maintain relationships (Diffley & McCole, 2015). Communication also reduces the risk of exclusion by offering opportunities for actors to understand products and services, exchange information, and engage in co-creation (Canhoto et al., 2016; Säwe & Thelander, 2015). Actors may misunderstand and misbehave based on false

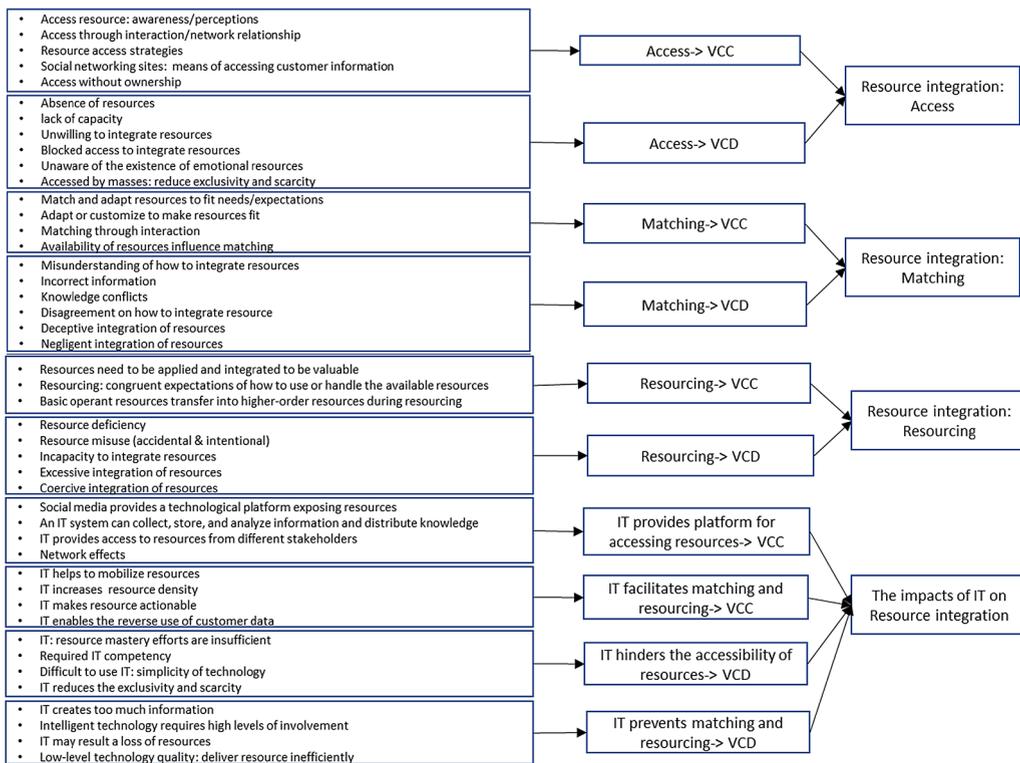


Fig. 2. (continued).

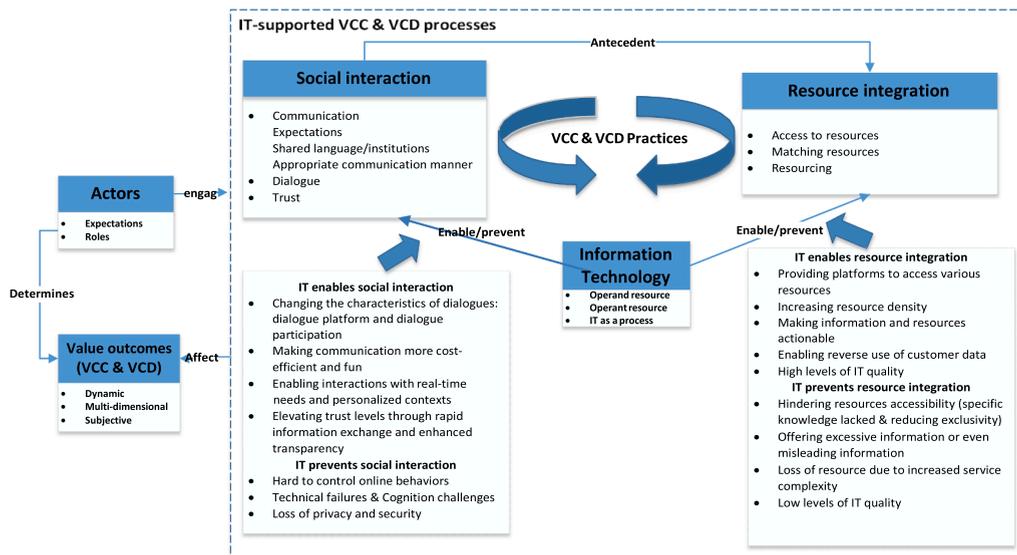


Fig. 3. IT-supported VCC and VCD in a service system.

assumptions owing to a lack of established systematic communication (Makkonen & Olkkonen, 2017) or inadequate communication (Vafeas et al., 2016); therefore, strategic communication among actors is essential for enabling VCC and preventing VCD. Based on the literature, three dimensions of communication are identified: communicating expectations, shared language/institutions, and communication styles.

(1) Communicating expectations

**Table 2**  
Definitions and clarifications of the key constructs.

Concepts	Definition/clarification	Sources
IT-supported value co-creation (VCC) and value co-destruction (VCD)	IT-supported VCC and VCD entail both process (include SI and RI, which is affected by IT and embedded in VCC and VCD practices) and outcome (an increase or decline in at least one of the systems' well-being, determined by actors in specific contexts).	This paper
Service system	'Value-co-creation configurations of people, technology, value propositions connecting internal and external service systems, and shared information (e.g., language, laws, measures, and methods)'	Maglio & Spohrer (2008, p. 18)
Social interaction	'Mutual or reciprocal action where two or more parties have an effect upon one another.'	Grönroos (2009, p. 14)
Communication	"An act of transmitting or broadcasting content by an organization that is meant to inform an audience".	Abeza et al. (2020, p. 473).
Communicating expectations	Informing and calibrating the expectations and goals with other actors accurately and interactively.	This paper
Shared language/institutions	Shared language: Adopting common terms, symbols, and understanding during communications.	Vargo & Akaka (2012) Akaka & Vargo (2014)
Communication styles	Institutions: characterized by shared rules and social norms. Communication styles include exchanging information in a timely and accurate manner and communicating with positive emotions and communicative skills.	Diffley & McCole (2015) Vafeas et al. (2016)
Dialogue	'Interactions, deep engagement and the willingness to act on both sides'	Prahalad & Ramaswamy (2004, p.9)
Trust	Trust is equivalent to "confidence in an exchange partner's reliability and integrity."	Morgan & Hunt (1994, p. 23)
Resource integration	"The incorporation of an actor's resources into the processes of other actors'."	Gummeson & Mele (2010, p. 192)
Access Matching	Access relates to the existence of potential resources and is accessible for actors. The fitness of available resources to create higher resource density and strategic interactions.	Caridà et al. (2018) Gummeson & Mele (2010)
Resourcing	The operation of available resources to transform and reinforce them for mutual benefit based on shared meanings and purposes.	Caridà et al. (2018)
Operand resource	An operand resource requires some action performed on it to have value.	Vargo & Akaka (2012)
Operant resource	An operant resource can act on other resources.	Vargo & Akaka (2012)
Practice	Practices can be understood as "doings and sayings" that actors routinely perform in a given social context.	Echeverri & Skälén (2011)
Value outcomes	Value outcomes refer to an increase or decline in at least one of the systems' well-being resulting from the IT-supported VCC and VCD process. They are multidimensional, subjective, and dynamically determined by actors in specific contexts.	This paper

Throughout value creation, communicating actors' collaboration-related expectations is essential during social interaction. [Säwe and Thelander \(2015\)](#) suggested that informing and calibrating interaction expectations is crucial to know the roles and events in collaboration. This can facilitate VCC by ensuring that the two service systems have congruent expectations about resource use during the interaction ([Plé & Cáceres, 2010](#)). [Järvi et al. \(2018\)](#) agreed that providing accurate expectations with correct information lays the foundation for VCC between actors and is important for informing all actors about the project stage and what is expected from them. Accordingly, a shared vision and mutual understanding can be achieved during the interaction ([Zhao et al., 2015](#)).

In contrast, VCD occurs without clear expectations or with inconsistent ones. It is impossible for companies to offer satisfying products or services if their customers cannot clearly express their expectations or needs ([Järvi et al., 2018](#)). Correspondingly, both organizations and customers may fail to match their understanding and expectations during the interaction ([Quach & Thaichon, 2017](#)). Actors may also have inaccurate expectations with inadequate communication simply based on previous experiences ([Järvi et al., 2018](#)). For example, when customers meet a new provider, they may expect the same experience with a previous provider. VCD may occur if these expectations are unmet. Moreover, actors may face inconsistency in expectations among different actors owing to role conflicts and ambiguity. For instance, employees may experience role conflicts and ambiguity concerning their task objectives and the client's expectations ([Chowdhury et al., 2016](#)). Inconsistent expectations might lead to job stress for employees and negative impacts on the provider–customer relationships and future interactions, leading to VCD ([Chowdhury et al., 2016](#)).

## (2) Shared language/institutions

Communicating with other actors in a shared language may enhance the clarity and possibility of VCC. By adopting common terms, symbols, and understanding during communications, actors use a shared language to facilitate effective communication and shared understanding with well-established codes of conduct ([Zhao et al., 2015](#)). [Zhao et al. \(2015\)](#) found that actors are more likely to contribute knowledge and have greater intentions to continue their memberships when shared language is used in online health communities. Contrarily, incorrect assumptions might occur when actors use different terms and assume that other actors can understand ([Järvi et al., 2018](#)). This may result from knowledge asymmetry due to specializations and/or skills ([Wang et al., 2019](#)). Hence, actors may have divergent or unclear understandings about the collaboration, leading to failed interactions and decreased well-

being (Canhoto et al., 2016).

Institutions, characterized by shared rules and social norms, are essential in influencing VCC interaction (Jefferies et al., 2019). They enable actors to exchange services and co-create value under temporal and cognitive constraints (Vargo & Lusch, 2016), thus enabling and restraining the actors' actions and interactions and affecting the value derived from those interactions (Akaka & Vargo, 2014). When shared by actors, institutions can cause a networking effect by facilitating a shared environment for various actors in the service system (Beirão et al., 2017). Notably, technology can shape and add new institutions by dynamically introducing new information and analytics, affecting actors' performances and decision-making (Jefferies et al., 2019). Barile et al. (2017) noted that technology such as artificial intelligence could continuously introduce new institutions that can increase coordination by extracting new information and analyzing data. However, VCD may occur when actors cannot adopt new institutions or when the institutions are inappropriate—for instance, actors may act without thinking about or re-evaluating the appropriateness of institutions in the current context (Vargo & Lusch, 2016). Actors may also fail to understand advanced technology's new institutions that require specific knowledge (Vargo & Lusch, 2016).

### (3) Communication styles

Literature suggests that communication styles concern whether the communication is timely and accurate, with positive emotions and communicative skills. Exchanging timely and correct information is essential for VCC and promotes coordination between actors (Vafeas et al., 2016). Communicating with up-to-date information is vital to offset any change in understanding the value of other actors in the value network (Diffley & McCole, 2015). Communication with positive feedback, such as likes and positive comments, motivates actors to stay active within social interactions. Even if feedback is not exclusively positive but is constructive for further improvement, it can elicit positive emotions such as a sense of accomplishment and competence (Faullant & Dolfus, 2017). Communicative skills of “listening, explaining, non-assertive response and a demonstration of understanding” contribute to VCC during interactions (Osei-Frimpong et al., 2015, p. 450). For example, by applying these two-way communicative skills instead of only questioning and answering in electronic healthcare settings, both doctors and patients can share detailed information, seek clarification, and eventually enhance opportunities for accurate diagnosis and VCC (Osei-Frimpong et al., 2018).

In contrast, VCD emerges with negative communication styles, such as communicating untimely, spreading negative emotions and word of mouth (complaining or blaming), and power exertion. Untimely communication results in delayed progress, additional costs, and diminishing value realization (Vafeas et al., 2016). Within coordination, untimely communication can involve poorly timed feedback and a lack of synchronized actions (Vafeas et al., 2016). Complaining involves communicating something negative about a product or service, and blaming is a kind of harmful complaining (Järvi et al., 2018). Blaming is especially detrimental when customers blame an organization for no reason or blame others for their own mistakes (Järvi et al., 2018). Organizations may consequently lose reputation and trust, thus losing customers and competitive advantage (Castillo et al., 2020). In addition, communication styles accompanying negative power exertion, where one actor is too dictatorial or domineering during social interaction, may negatively impact VCC (Chowdhury et al., 2016). For example, the agency may be unwilling to engage in VCC when one client exerts power by trying to boss the agency around (Chowdhury et al., 2016).

### Dialogue

As an integral part of an interaction, dialogue is defined as “interactions, deep engagement and the willingness to act on both sides” (Pralhad & Ramaswamy, 2004, p. 9). Dialogue facilitates strategically engaging actors in the “joint” creation of value without either party controlling the interaction (Alimamy et al., 2018). Engaging actors in dialogue is a two-way interaction and an iterative, mutual learning process, compared with just listening, allowing, and encouraging (Keeling et al., 2020; Okazaki et al., 2020). Therefore, dialogue is a critical element of VCC, facilitating mutual information extraction (Diffley & McCole, 2015) and being open to learning and interacting together (Truong et al., 2012). In this paper, *dialogue* is used distinctly from *communication*. The former stresses two-way interactions, whereas the latter focuses on communicated content and communication styles during interactions.

VCD, however, may occur when platforms for dialogue are unavailable or used inappropriately (Keeling et al., 2020). Without dialogue, actors cannot interact bidirectionally, leading to asymmetrical information and a greater power imbalance (Vafeas et al., 2016). In such scenarios, all actors do not have the same access and transparency to information and other resources (Pralhad & Ramaswamy, 2004) and are likely to experience misunderstandings. Moreover, a lack of dialogue may disable resource integration in the initial phase of resource matching and lead to VCD (Caridà et al., 2018).

### Trust

Trust, “confidence in an exchange partner's reliability and integrity” (Morgan & Hunt, 1994, p. 23), is a fundamental driver of collaborative value formation (Åkesson et al., 2014; Alalwan et al., 2019). For example, patients feel freer and are more willing to share information with doctors when they trust them, resulting from previous experience (Osei-Frimpong et al., 2015; Zhao et al., 2015). Relationship quality and loyalty increase when trust exists between actors (Hajli et al., 2017). Hadaya and Cassivi (2012) found that joint collaborative planning anchored in control and trust can strengthen the relationships between actors in supply chain collaborative systems; this well-structured interaction can be seen as a vital governance mechanism for enhancing the chain of IT VCC. Alimamy et al. (2018) suggested that the opposite of risk is trust. Thus, companies can reduce the risk of purchases by increasing trust during interactions.

VCD occurs when actors interact without trust or when trust is “blind” and with opportunistic behaviors. Without trust, actors will not open up to each other and will be unwilling to share relevant resources (Åkesson et al., 2014). However, when trust is excessive or

“blind,” the potential for VCC is limited—for example, actors may commit to resources beyond their needs and experience ineffective resource integration (Wang et al., 2019). An excessive trust may also make one actor too dependent on another. VCD may occur when one actor fails to provide another with promised resources, as the actor affected by this failure may not have formed an alternative plan for achieving the desired outcome (Wang et al., 2019). *Opportunism* describes situations in which people seek their interests in conflict with the principle of VCC and violate their mutual trust with other actors during interactions—for example, clients may act opportunistically by persuading agencies to agree to perform additional tasks without payment (Chowdhury et al., 2016). Although behaving opportunistically at the beginning of a relationship is risky, weak-form opportunism is tolerated in long-term interactions. It is sometimes used as a managerial tactic to maintain long-standing relationships with customers (Wang et al., 2019).

#### *Social interaction toward resource integration*

Social interaction between actors is the antecedent of resource integration (Bruce et al., 2019). Through interaction, actors in a network can access specific kinds and quantities of resources (Plé, 2016). For instance, Plé (2016) identified 12 potential resources in a study of service employees' interactions with customers, implying that interactions between actors are a means to gaining access to resources and a platform for integrating them, aiming for VCC (Singaraju et al., 2016). Interactions can also produce varying resources for value formation. For example, transactional big-data resources derive from transactional interactions between customers and companies (Xie et al., 2016) and can thus be analyzed to guide operations and improve companies' future performance. Communication interactions among actors generate data resources for analysis to identify better customer needs and expectations (Diffley & McCole, 2015). Therefore, actors can own physical or digital resources but, without interactions, cannot leverage resources or transfer those resources into cooperative assets because interactions create a foundation for exchanging resources (Truong et al., 2012).

#### *Role of IT in social interaction*

Inspired by Jurietti et al. (2017), we summarize that IT changes the characteristics of dialogues from two perspectives: dialogue platform and dialogue participation. A *dialogue platform* is a set of various communication instruments through media richness and self-presentation (Jurietti et al., 2017). This means that IT changes actors' dialogue experiences by enhancing media richness through engaging participants in effective communications and facilitating opportunities for actors to disclose opinions, beliefs, or information on virtual platforms. Alimamy et al. (2018) used the example of augmented reality to show that IT provides dialogues between customers and organizations by incorporating digital elements into the physical world. Such technology makes customers feel informed and connected by offering providers new ways to engage them and providing customers platforms to gain knowledge and information (Alimamy et al., 2018). The development of live communication tools in an online environment also enabled the building of dialogues directly between companies and customers (Zhang et al., 2018). For example, Okazaki et al. (2020) illustrated that social media platforms provide dialogues for customers to generate ideas, receive feedback, etc., thus shifting the consumer's role from a receiver to a co-creator. Online engagement platforms provide touchpoints for interactions between actors (Hollebeek et al., 2017; Luo et al., 2019), for example, by providing online forums to discuss various topics and exchange ideas. Therefore, IT empowers actors to be more involved in decision-making with the provided platforms (Osei-Frimpong et al., 2018).

*Dialogue participation* has two essential aspects: autonomy and exclusivity (Jurietti et al., 2017). IT enables actors to freely engage in interactions and express themselves with a high level of autonomy (Zwass, 2010). Virtual communities, enabled by social media, are usually used as a new means of engaging customers on platforms where they can feel free to enter, leave, and exchange information and communicate about specific products or brands without time and space limitations (Cheung et al., 2020a, 2020b). Complementarily, virtual dialogues are exclusive due to restrictions on the number of participants, which reveals a community's distinctiveness and can lead to increased social identification, an important resource for VCC (Zhao et al., 2015). Storbacka et al. (2016) recognized IT's potential in affecting dialogues through its ability to change the number and variety of actors available for engagement and the volume of interaction joints among actors, enhancing the possibility of VCC. IT impacts on autonomy, and the exclusivity of dialogue participation represents a two-way influence during the interaction process.

Literature indicates that *IT might make communication more cost-efficient and fun*. Virtual communities can support companies in better understanding consumers' needs and expectations in new product development at a low cost and can facilitate collective thinking (Bugshan, 2015). Thus, social media provides both social and informational support for actors involved in online communities and is considered cost-efficient for open innovation when companies need support from external sources (Bugshan, 2015). Chatbots are a new type of interaction through which companies co-create value for customers by making information and data conveniently accessible based on a discussion-like interface (Riikkinen et al., 2018). Specifically, chatbots are supported by an intelligent system that responds to customers with suggested answers in text format automatically and immediately (Riikkinen et al., 2018). Social robots represent another IT-enabled service for convenient communication and can reduce long-term costs for organizations. For example, a nursing home can benefit from using social robots to save money. The robots will not quit working because of sickness or boredom, and they can easily be programmed to adapt to changes in their working environment (Laud et al., 2019). Nobre and Ferreira (2017) argued that IT enables the VCC experience to be more pleasant through gamification systems. An IT-based gamified approach provides an enthusiastic way of communication to stimulate customer motivation to engage and connect with a brand. The richness and pleasantness of the environment increase customer willingness to share their experiences with others, improving communication.

*IT can help elevate trust among actors during social interactions through rapid information exchange and enhanced transparency*. To build trust, actors need time to know each other and develop relationships through regular meetings. Advances in IT facilitate such interactions by making rapid information exchange possible in digital environments (Alimamy et al., 2018). IT increases customers' trust in brands by providing sharing environments wherein they can see the experiences and knowledge shared by other customers about the

brand (Tajvidi et al., 2017). Textual information shared through online discussions among customers can reduce the perceived risk of using a new brand when they see both its pros and cons (Tajvidi et al., 2017). IT also facilitates trust by enhancing transparency in VCC (Lusch & Nambisan, 2015). For example, an online platform can make a work process transparent by offering customers documentation and how-to guides that are easily accessible on the platform (Hein et al., 2019).

*IT enables SI based on real-time needs and offers a personalized context.* The development of cognitive technology and big data technology enhances actors' ability to react based on real-time needs by providing dynamic content that involves the actors' ongoing behavior. Instead of pre-defining problem analysis and solution formulations, cognitive technology can provide decision support through the continuous elaboration and analysis of real-time data (Mele et al., 2020). For instance, social robots are used in aged care to improve patient well-being (Laud et al., 2019). Robots continuously document and reconstruct daily data and prepare for future reactions (Mele et al., 2020). Mingione et al. (2020) provided examples of using sentiment analysis to analyze interactions in online brand communities. By identifying pain points and analyzing consumer sentiments at each step of the shopping experience, a company can develop targeted, customer-centered strategies for brand communication (Mingione et al., 2020). These technologies affect actors' behavior in both predetermined and dynamic ways based on the intertwining of different data and information (Mele et al., 2020) and shape the interactions between actors to be more contextual and customized (Storbacka et al., 2016).

However, *IT can lead to negative interactions owing to the ease of spreading negative comments, technical failure, and cognition challenges.* The volume of customer complaints has increased because of the public nature of the Internet, as social media makes communicating opinions with others easier (Castillo et al., 2020; Rosenthal & Brito, 2017). For example, customers can easily and publicly manifest behaviors that harm companies (e.g., by posting negative reviews), and companies can have little control over them (Järvi et al., 2018). Some participants on a crowdsourcing platform mentioned that they suffered from negative feedback and even bullying from others during SIs, resulting in withdrawal and negative emotions (Zhang et al., 2018). Moreover, IT can sometimes facilitate failed communication and lead to VCD. For example, technological failures may occur during a service process and disable the interactions between a customer and an organization. Because customers expect companies to solve system-related issues and maintain robust technology environments, this communication failure can lead to VCD (Zhang et al., 2018). Another example of communicating with artificially intelligent chatbots where IT can fail to interact effectively due to cognition challenges. A common issue is that chatbots cannot understand communication when customers give excessive descriptions and questions or when the exact answer is provided to different questions (Castillo et al., 2020).

*IT can also lead to a loss of privacy and security during social interactions.* Jayashankar et al. (2019) clarified that farmers were worried about data ownership and privacy when using digital agriculture, which caused relational tensions, thus affecting trust and VCC. Specifically, the yield data were stored in the cloud so the service provider could use the data to undermine farmers' benefits, such as selling information to others. The farmers might then receive massively annoying advertisements. Čaić et al. (2019) asserted that social robots might lead to destructive consequences, such as a loss of privacy, personal data leaks, or monitoring concerns. Hsiao et al. (2019) also mentioned that although mobile payment has a noticeable advantage that enables transactions to happen anytime from anywhere, security issues are involved owing to the vulnerable characteristics of mobile networks (Hsiao et al., 2019). Therefore, IT-related privacy and security issues need to be addressed to avoid failed interactions.

### Resource integration

Gummesson and Mele (2010, p. 192) defined resource integration as "the incorporation of an actor's resources into the processes of other actors." Resource integration is a central mechanism in the interactive value-formation process (Caridà et al., 2018). Based on the literature review, three dimensions of resource integration are found in both VCC and VCD processes: access, matching, and resourcing.

#### Access

To co-create value, actors must first be aware of and have access to potential resources (Caridà et al., 2018; Rusanen et al., 2014). Technological development increases the ease of access to external resources and provides opportunities for further collaboration (Zwass, 2010). For instance, Diffley and McCole (2015) mentioned that social networking sites are an increasingly important means of accessing customer information in the hotel industry. Du and Chou (2020) proposed that actor-to-actor interactions mediated by digital platforms provide access to resources without paying for ownership, which gives customers more options without limitations (Alimamy et al., 2018). For example, actors can access songs and movies through iTunes and Netflix, respectively, without describing full albums or channels through an online collaborative subscription service (Alimamy et al., 2018).

In contrast, VCD might emerge if actors cannot access resources, hindered by an objective absence of resources or a lack of awareness. For example, the absence of information occurs when both parties cannot provide or process information (Robertson et al., 2014; Smith, 2013). This can happen because others are unwilling to provide reciprocal resources or do not have the required skills (operant resource) to be effective resource integrators (Farquhar & Robson, 2017). Laud et al. (2019) claimed that due to biases, stereotyping, prejudices, etc., deliberate restriction or prevention would also block access to resources. Grönroos (2012) added that resource accessibility involves not only physical but also mental and emotional accessibility. Sometimes, actors are unaware of the existence of emotional resources within certain contexts. For example, a waiter might notice a customer's physical disability and wheelchair (a physical resource) but might be unaware of the customer's current mood (an emotional resource; Plé, 2016). In this situation, VCD can occur if one actor cannot access another's emotional resources and unintentionally behaves in an offensive or unexpected way.

### Matching

As the guiding principle of resource integration, *matching* is defined as the fitness of available resources to create higher resource density and strategic interactions (Gummesson & Mele, 2010). Resources can be complementary when they diverge in quantity and quality or redundant when they are similar and increase joint volume (Gummesson & Mele, 2010). To improve the well-being of service systems, actors should be able to match and adapt resources to fit their needs (Plé, 2016; Laud et al., 2019). Bruce et al. (2019) proposed that “integrable quality,” “the extent to which resources possess the characteristics necessary to support resource integration activities” (p. 182), has affects whether VCC or VCD occurs. Through interaction, employees must assess the customers’ available resources against their own and match the two to provide products or services that meet customer expectations (Plé, 2016).

However, VCD occurs when resource matching fails. Actors can fail to match resources owing to knowledge asymmetry. Customers may misunderstand and/or misevaluate a value proposition because an organization fails to communicate clearly (Wang et al., 2019) or cannot provide correct information (Järvi et al., 2018; Laud et al., 2019), leading to failure of resource matching. Actors might disagree based on their own needs when they experience conflicts over integrating their goals, resources, and practices (Osei-Frimpong et al., 2015). Laud et al. (2019) identified two other manifestations of deliberate misintegration during the adapting stage: deceptive and negligent integration of resources. Actors might fail to match or adapt resources given purposeful concealment, misrepresentation, inattention, or carelessness by at least one actor in the resource integration process (Laud et al., 2019).

### Resourcing

Resources in isolation do not have value unless they are integrated or applied through interactions (Robertson et al., 2014). Resourcing involves the operation of available resources to transform and reinforce them for mutual benefit based on shared meanings and purposes (Caridà et al., 2018). During resourcing, basic operant resources transfer into higher-order resources, improving the sustainability of an organization’s competitive advantages and leading to VCC (Paredes et al., 2014). The organization can benefit from a synergic effect in which the integrated resources become more valuable and less easy to imitate than distinctive resources before integration (Hadaya & Cassivi, 2012).

However, VCD might emerge when resources are deficient or misused intentionally or accidentally (Farquhar & Robson, 2017). Plé and Cáceres (2010) defined the term *misuse of resources* as integrating and/or applying resources in an unexpected and/or inappropriate manner. For example, customers may deliberately break a product and blame a provider, even if the provider offers support and information about how to correctly use the product (Järvi et al., 2018). Plé and Cáceres (2010) identified four cases of intentionally misusing resources: role conflict, employee misbehavior, distribution-channel management, and customer misbehavior for their benefit while co-destroying a company’s value. In contrast, customers may misuse or be unable to use an organization’s resources owing to resource deficiency, such as when they lack adequate knowledge, skills, or time to operate the resources during the interaction, leading to VCD (Castillo et al., 2020; Farquhar & Robson, 2017).

### The role of IT in resource integration

*IT can enable resource integration by offering a platform to access various resources.* For example, Chang et al. (2017) described an electronic medical record–exchange system as a platform that combines multiple resources in medical settings, thus providing actors with more opportunities for VCC by increasing their ability to identify and exploit information from other actors. For example, e-health services can address the unaffordability and inaccessibility of health care and improve medical treatment and diagnosis but also patients’ involvement in the service (Robertson et al., 2014). In another vein, technologies such as self-service (Du & Chou, 2020) and social media platforms offer actors accessibility to resources from other interacting actors. They also facilitate the integration of those resources’ economic, technical, and social features into the creation of new resources (Abbate et al., 2019; Singaraju et al., 2016; Zadeh et al., 2019). The network effect is more apparent when more adopters use a platform, thus providing more valuable resources for VCC (Yu et al., 2019).

*IT can also contribute to VCC by enabling resource matching and resourcing through increased resource density and reverse use of data.* Beirão et al. (2017) suggested that IT-enabled platforms increase resource density (the mobilization of a combination of contextually relevant resources for a situation; Blaschke et al., 2019) and foster resource integration through efficient and effective service exchanges. IT as an operand resource helps with seeking and bundling appropriate resources and facilitating resource matching within and across service platforms (Paschen et al., 2020). For instance, digital tools empowered by cognitive technologies affect actors’ resource integration processes by making information and resources actionable through the active design of choice content (Mele et al., 2020). For example, smart wearables provide multiple pre-determined choices (resources) based on the real-time data in wearable devices to meet consumers’ needs (Mele et al., 2020). This opportunity is based on a design that enables the tangible component to acquire and set information, whereas the intangible component analyzes the data and creates new resources (Mele et al., 2020). The efficiency and effectiveness of VCC are enhanced by these technologies, with increasing resource density and easy access to appropriate resource bundles (Xie et al., 2016). Big data technologies are usually combined to enable extra information based on the analysis of massive data and multiple interactions, which increases the richness of resources and assists actors in making better decisions by providing updated resources. Similarly, Sorensen et al. (2017) argued that social media posts could be used as resources to plan and adapt social media strategies to enhance customer engagement. The reverse use of customer data represents a new way of exploring the potential of customer data and facilitating customers’ VCC processes (Riikkinen et al., 2018).

However, VCD occurs when *IT hinders the accessibility of resources owing to a lack of specific knowledge, or eases resource access to masses, reducing exclusivity.* IT causes VCD when actors’ resource mastery efforts are insufficient (Breibach & Maglio, 2016). Diffley and McCole (2015) claimed that appropriate IT infrastructure and employees’ IT competencies, such as skills and knowledge, are

required to use IT resources effectively. For instance, knowledge and intellectual resources are particularly needed in the early stages of the high-tech market to avoid VCD (Park & Lee, 2015, 2018). The simplicity of the technology, which is the degree of difficulty when using and adapting technology, is considered an important aspect of the company's technology-related collective strength (Sarker et al., 2012). Therefore, companies planning to apply IT-related systems for VCC with customers should also consider the ease of use of the technology and the knowledge required by the targeted customers. Moreover, VCD might occur as the development of technology eases resource access to the masses, which reduces the exclusivity and scarcity of certain communities. For example, some customers do not want to associate with different social classes. Still, they cannot avoid this when joining brand communities or when brands are tagged on social media (Quach & Thaichon, 2017).

*IT may also lead to VCD in matching and resourcing.* IT can create an environment with excessive or even misleading information. Consequently, actors might spend more time obtaining the correct information or match resources with the wrong information in unexpected ways (Bruce et al., 2019). Thus, an organization must facilitate resource matching by providing technology that sorts, relates, and considers actors' expectations of its resources. Some authors have argued that using IT may also waste resources. For example, service complexity increases when artificial intelligence technology is applied because it always requires customer participation (Castillo et al., 2020). As customers spend time and effort with higher levels of involvement, unmet expectations may cause frustration and anger, resulting in a loss of resources, such as patience and time (Castillo et al., 2020). VCD might also occur when the technology quality cannot meet customers' needs. For instance, the simplest form of chatbot only provides low levels of support for customers, usually supplying the same type and amount of information because low-level technology quality can only adopt AI and reverse the use of customer data in a limited manner (Riikkinen et al., 2018). In this respect, these chatbots fail to offer additional resources and to deliver resources efficiently. Advanced chatbots with effective data analysis or predictive support add value by saving customers' time and helping them access new resources to integrate into their VCC processes (Riikkinen et al., 2018). Therefore, knowing the functionality, reliability, and other characteristics of the technology itself is essential (Barrutia et al., 2016; Sarker et al., 2012). For example, Hu et al. (2019) suggested four dimensions to check technology quality for social commerce: attractiveness, reliability, accessibility, and customer flexibility.

#### *VCC and VCD practices*

The synthesis and analysis of the literature reveal that practice is essential for VCC and VCD (Ardley et al., 2020; Du & Chou, 2020; Korkman et al., 2010; Russo-Spena & Mele, 2012). Practices can be understood as "doings and sayings" that actors routinely perform in a given social context (Echeverri & Skålén, 2011). Through interactions, practices lead to experiences that have both positive and negative value formations. Practices in service systems are dynamic and can consequently enable transitions between VCC and VCD by mapping different routes for interactions (Von Becker et al., 2015). Therefore, practices are vehicles for realizing value (Frow et al., 2016) and can provide a critical lens and processual insights for understanding VCC and VCD in various social contexts (Korkman et al., 2010).

Resource integration and social interaction studies allow researchers to connect practices and value formation more explicitly. Vargo and Akaka (2012) suggested that value is co-created by enacting practices. Resource integration is the central feature of practices because when actors integrate resources by enacting practices, they interact with other actors and contribute to VCC processes. Some authors proposed that value does not preexist; instead, it comes from distinct social practices where resources are integrated (Skålén et al., 2015; Vargo et al., 2015). VCC practices shape service ecosystems by influencing resource integration through enabling access to new pools of resources and offer opportunities for additional resource integration (Frow et al., 2016; Korkman et al., 2010). Suseno et al. (2018) found that practices related to value creation arise from actors' interactions within a digital innovation ecosystem. In studying interactions among actors, the point of departure is the observability of the interactional practice (Echeverri & Skålén, 2011). Luo et al. (2015) indicated that VCC practices strengthen interactions among community members, bringing members closer and increasing their loyalty to a brand. Practices also implicitly coordinate interactions in value formation by assigning meanings to signs and signifiers (Akaka & Vargo, 2014). For example, by involving a brand community in value-creating practices, community members can better understand the brand's offerings and share brand experiences (Sanz-Blas et al., 2019). Therefore, understanding practices enables analyzing the social connections among actors and their situated contexts (Russo-Spena & Mele, 2012). Companies can plan their practices to enhance customers' brand community experiences and facilitate value (Sorensen & Drennan, 2017).

Cabiddu et al. (2019) identified two types of VCD practices based on cross-case analysis: practices related to resource integration and social interaction. The former demonstrates what actors do when managing the integration of cultural and economic capital, such as improperly using knowledge or economic resources. In contrast, the latter depicts how actors act to decrease social and symbolic capital, such as not interacting under social rules or damaging actors' legitimacy. By identifying these VCD practices, managers can quickly respond and make decisions accordingly to avoid risks and potentially destructive collaborations (Frow et al., 2016).

#### *Value outcomes*

Value outcomes refer to an increase or decline in at least one of the systems' well-being resulting from IT-supported VCC and VCD processes. However, a misalignment practice does not always lead to permanent VCD because coping mechanisms such as a realignment strategy can potentially turn VCD into VCC, framing dynamic value outcomes (Laud et al., 2019). Furthermore, Pinho et al. (2014) noted that value is dynamic owing to three kinds of interdependencies: dynamic role interdependency (the actor's role may change over time), temporal interdependency (SI occurs sequentially), and self-interdependency (VCC depends on the

individual's perceptions and actions). Thus, VCC outcomes are interdependent and dynamically influence actors within the service system (Beirão et al., 2017; Laamanen & Skålén, 2015).

Value outcomes are also multidimensional and subjectively determined by individual actors. Several scholars have discussed values based on distinct categories. For example, Kim et al. (2020) examined how other customers' VCC and VCD behaviors can influence focal customers' perceived value, including economic, emotional, epistemic, and social value. Keeling et al. (2020) described how longitudinal VCC and VCD occur based on the value of efficiency, excellence, and esteem in health service interactions. An actor's perception determines the value outcome. The same practice may lead to VCC for one actor and VCD for another, depending on the actor's expectations and perceptions of the context (Kim et al., 2020). Therefore, value is a function of actors' articulated sets of preferences (Echeverri & Skålén, 2011); it is collectively created but subjectively assessed (Säwe & Thelander, 2015).

## Discussion and implications for research and practice

Our study contributes to the literature by improving the understanding of VCC and VCD from various new perspectives and addressing the identified research gaps. Thus far, previous literature reviews have mainly focused on VCC and summarized the themes and theories that have gradually developed and the definitions, drivers, and consequences of VCC (Galvagno & Dalli, 2014; Leclercq et al., 2016). However, little is known about VCD, let alone the relationship between VCC and VCD. Our study fills this research gap, as considering the possibility of VCD is essential for providing a critical understanding of value formation and thus avoiding "co-creation myopia." Notably, this is the first study on IT-supported VCC and VCD constructs in a service system with congruent definitions, addressing the incongruence of constructs from previous literature and providing a shared language for understanding relevant phenomena. Our findings indicate that VCC and VCD should entail both process and outcome perspectives. The same social interaction and resource integration process may result in different outcomes for different actors involved. One actor may experience the dynamic transition of VCC and VCD throughout the collaboration. Diverse consequences would be ignored if we only focus on the process perspective. In contrast, the outcome-oriented perspective might ignore the dynamic changes of actors' experiences and perceptions during the process.

The constructs articulate the key elements underpinning IT-supported VCC and VCD via social interaction and resource integration and their interconnections. This is important because "the whole is best understood from a systemic perspective and should be viewed as a constellation of interconnected elements" (Fiss et al., 2013, p. 2). Therefore, the arrangement of the elements or attributes, rather than the nature of social interaction and resource integration, leads to VCC and/or VCD. The identified constructs can assist in the empirical analysis because well-defined constructs are easier to operationalize and test (Suddaby, 2010). As VCC and VCD are abstract concepts, the findings enable us better to understand VCC and VCD with actionable and observable elements. Furthermore, this study broadens the existing knowledge on value formation by adopting the service system perspective, responding to the call of Smith (2013) for a network/system approach to understanding VCC and VCD and Farquhar and Robson's (2017) call to examine how VCC and VCD operate within a service system. Our findings explain how actors, processes, IT, and value outcomes are connected at the system level, suggesting a strategic analysis of VCC and VCD in service systems.

Our paper also contributes to the existing literature by examining the role of IT in the interactive value-formation process, an under-researched topic, as most previous studies have focused on either a business or management perspective. This study thus responds to the call for more IT-related research regarding the value formation process (Blasco-Arcas et al., 2014) because technological advancements have profoundly changed the nature and process of value formation (Akaka & Vargo, 2014). In particular, how IT affects the underlying elements of social interaction and resource integration is identified and explained, suggesting that IT can both enable and prevent the value formation process in various ways. Investigating the role of IT as an outcome and a process and the mechanism of how IT contributes to VCC and VCD facilitates an understanding of how digital tools can initiate innovation and bring challenges. This is particularly useful for understanding IS phenomena such as IT innovation and IS analysis and design, as IT does not always ensure benefits. This perspective complements current literature by considering the negative role of IT instead of only the positive one.

Moreover, our research has implications for research by indicating many exciting avenues for future study. We explain how these themes relate to our findings and why addressing them is important based on five different themes. Possible research questions and research approaches are also suggested:

*Theme 1: Actors in VCC and VCD.* The service system perspective limits the understanding of VCC and VCD from an individual-level perspective, which is essential as they offer insights into distinct groups of people and facilitate strategizing based on target groups. Therefore, future research can examine, for example, the characteristics of individual actors in a specific context and the relationships and tensions in the VCC and VCD process. More detailed research questions of interest can be: •Do the actors' attributes (e.g., gender, education, nationality, etc.) influence the VCC and VCD process? •How do actors' roles affect their perceptions of VCC and VCD processes and outcomes? •How can the relationships and tensions among actors affect the VCC and VCD process? •Do tensions always lead to VCD? •Do more actors mean more resources but more difficulties in interaction? Either conceptual or empirical research may enrich the results based on different research questions. Besides, the complexity of value formation also indicates that different value outcomes may arise in different contexts, suggesting studies on different cultures, countries, and industries.

*Theme 2: IT types and IT quality related to VCC and VCD.* Our findings indicate that diverse technologies and IT quality levels affect VCC and VCD in various ways, suggesting that future research should further study the phenomenon and understand the embedded mechanisms. This can be useful for managers to integrate better resources based on distinct needs since different technologies represent different choice architectures. Without a value-based classification of IT, it is difficult to link a specific type of IT to a particular value in the VCC process. Therefore, we argue that classifying IT from a value perspective is critical in understanding IT-supported VCC and VCD. In addition, it is vital to understand the mechanism of how the IT quality level affects VCC and VCD,

trading investments for benefits. To this end, managers can make the best choice by deciding what levels of IT quality should be provided to customers at the lowest cost while meeting customers' basic expectations. Potential research questions can be: • How do different types of IT contribute to VCC & VCD? E.g., IT-based on its function/features, the applied contexts, the outcomes pursued, etc., and how they affect diverse forms of value. • How to define IT quality level and how to measure it? • Does the IT quality level mediate the effect of IT on VCC and VCD? A mixed-methods approach of qualitative and quantitative research may enrich the results.

*Theme 3: VCC and VCD process in different stages.* Our research provides a theoretical foundation for understanding the IT-supported VCC and VCD, but the lack of empirical support suggests new possibilities for studying the relevant phenomenon. As one case, the dynamic IT-supported VCC and VCD processes indicate that a longitudinal study may provide valuable insights. Understanding these processes across the lifecycle phases of a digital service is essential so managers can distribute their resources strategically and focus on interactions that maximize benefits in certain stages. Example research questions can be: • Do the elements of resource integration have diverging impacts on value outcomes in varying life-cycle stages? • Does social interaction differ in different stages? • Does IT play different roles in different phases of a project? A longitudinal study is encouraged to investigate these issues. Furthermore, conducting case surveys to collect empirical data on VCC and VCD would considerably contribute to the respective research communities. These empirical studies would provide a foundation for illustrating the actual realization of VCC through IT-supported platforms and services and informing design considerations in such IT-supported instances.

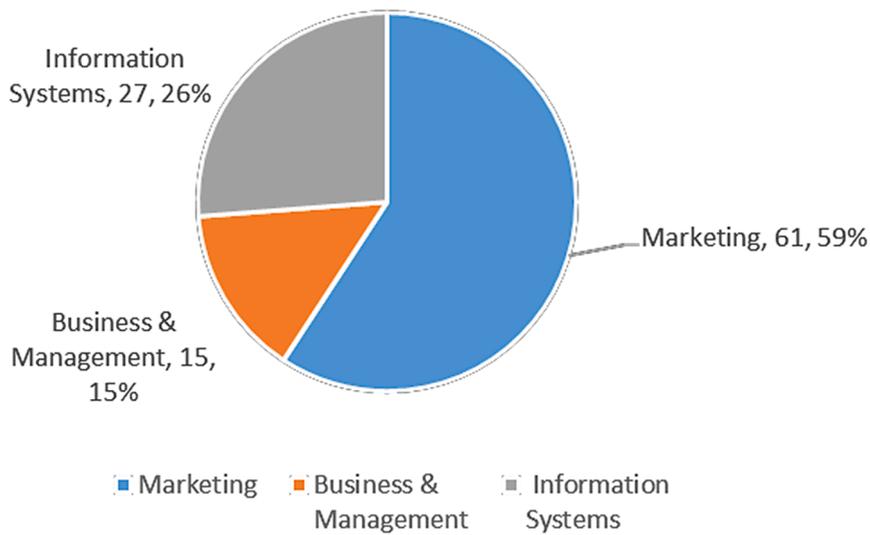
*Theme 4: Measurements of relevant constructs.* Our study only identified "what" and "how" elements of social interaction and resource integration can contribute to IT-supported VCC and VCD, indicating that more research is needed to focus on the assessment and measurement of relevant concepts. Research on these issues can offer insights for designing the service to ensure resources and high-quality interactions. Thus, prospective research is motivated to measure the constructs of IT-supported VCC and VCD to realize appropriate modular architectures and IT applications. An example of research questions can be: • How to measure VCC and VCD from the perspective of process and outcome? • How to measure the effects of IT on VCC and VCD? E.g., does the frequency of IT use affect VCC and VCD? • How to measure the effects of social interactions on IT-supported VCC and VCD? E.g., is the frequency of interactions as important as their quality? • How to measure the effects of resource integration on IT-supported VCC and VCD? • Do the "levels of access" of resources have varying effects on the value formation process, and how to measure them? An empirical approach may enrich the results by applying either qualitative or quantitative research.

*Theme 5: VCC and VCD related to IS design and governance.* Our findings have identified many IT-related perspectives that can lead to VCC and VCD, which are essential to consider when designing an IT-based platform for interaction to minimize potential negative outcomes. However, there is a lack of evidence-based design knowledge on service systems to enhance VCC (Böhmman et al., 2014). Research for planning and executing strategic design and development can focus on questions such as • How to design a platform with less system complexity but maintain its functions for VCC? • How can community governance and customer freedoms of behavior be balanced within the online community from the perspective of VCC and VCD? • How can an interface be designed to efficiently collect and analyze customer data while considering privacy and security? Researchers and managers can target these questions to comprehend and facilitate VCC factors. This can provide valuable insights for IS design and governance. Finally, we encourage future researchers to extend further or revise our framework to study IT-supported VCC and VCD. Design science research may be an attractive approach, as IT-supported VCC and VCD not only involve understanding a service system's actors' behavior but are also related to the design, development, and management of an IT platform or artifact. Design science research may thus offer a suitable analytical framework for understanding factors regarding the process of innovation (Nambisan, 2013; Peffers et al., 2007), where our framework of IT-supported VCC and VCD in service systems could offer a unique perspective.

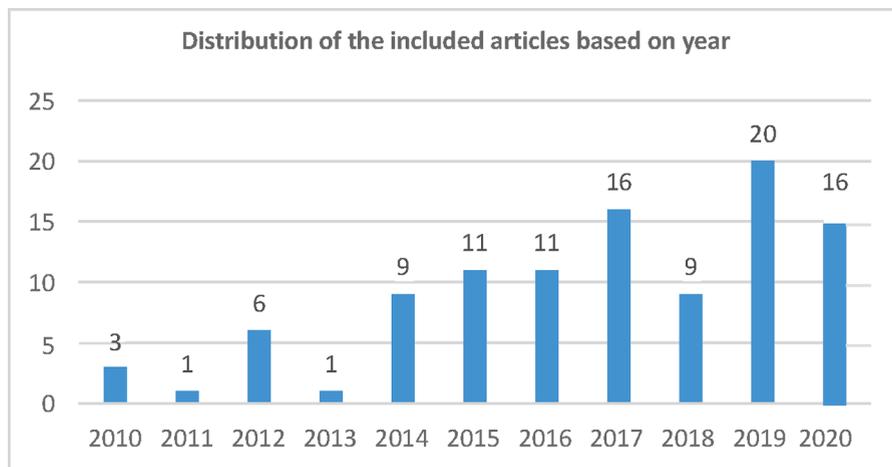
Our findings have several implications for practice. First, IT offers organizations various options to co-create value with customers and can be considered a strategic, complementary asset that enables organizations to integrate resources from external actors. However, our findings suggest that co-creation activities through IT should be carefully planned, designed, and evaluated to facilitate positive results because IT might also hinder value formation. For example, companies can create an online community to increase access to many potential customers. However, they need to maintain a certain degree of exclusivity among community members to feel valued and unique. Moreover, designers and developers should consider system complexity, ensuring that it is easy to use and does not require inordinate knowledge and skills to work. If knowledge is required, the platform should provide clear instructions using shared languages and institutions. Sorting and searching functions should be provided when the amount of available information is large. For instance, big data and cognitive technology can provide analytical results from massive data and respond to customers' real-time needs. Organizations need to evaluate IT quality and make a trade-off between the benefits and limitations, combining customers' expectations. In doing so, potential VCD practices can be identified and transitioned into VCC before developing and introducing products into service contexts (Cai et al., 2019).

Besides, our findings suggest that organizations should carefully construct their social interaction strategies to minimize unwanted responses. Despite the significant role of IT in facilitating interactions and resource integration, many aspects still require human effort. For example, organizations can arrange relevant training to increase service employees' skills in rapidly analyzing social contexts and frontline employees' communicative skills. When these preemptive tasks are undertaken, skilled employees can quickly and accurately identify resources during interactions, reduce organizational costs, and increase productivity. In many cases, IT can facilitate interactive dialogue and create trustworthy environments to build long-term relationships with customers and other stakeholders. Online brand communities can be used to communicate with customers and collect customer feedback and innovative ideas. Big data technologies can collect and analyze customer data to better understand customers' needs and market changes. However, our findings indicate that organizations should set up governance rules to avoid groundless, negative word of mouth, cyberbullying, and rules for the appropriate use of customer data to ensure security and privacy. Organizations should also be prepared for IT failures and challenges and plan reaction mechanisms to reduce customer complaints when such problems occur.

**Distribution of the included articles in marketing, management, and IS**



**Fig. B1.** Distribution based on fields.

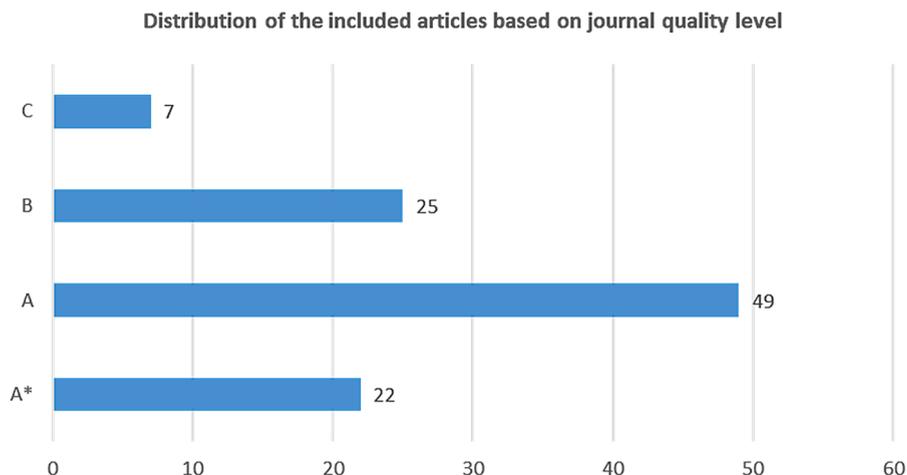


**Fig. B2.** Distribution based on year.

Communication with customers after an IT failure is also important for rebuilding customers’ confidence in the organization and planning actionable VCC practices. Finally, our findings will allow organizations to recognize a negative situation quickly, adjust their strategies toward desired outcomes, and inspire system and service development.

**Concluding remarks and limitations**

Our study proposes a conceptual framework depicting the constructs of IT-supported VCC and VCD in a service system. This study is the first to suggest that IT-supported VCC and VCD are triggered by two interdependent processes—social interaction and resource integration—affected by IT and embedded in interactive value-formation practices, leading to VCC and VCD outcomes. Literature review reveals that communication, dialogue, and trust are the elements of social interaction, and resource integration involves access, matching, and resourcing. This conceptual framework also asserts that IT significantly affects social interaction and resource integration in the VCC and VCD processes. IT enables social interaction by providing platforms for dialogue and communication, changing the dialogue characteristics with enhanced media richness and autonomy, making communication more cost-efficient and personalized based on real-time needs, and elevating trust with rapid information exchange and enhanced transparency. Meanwhile, IT enables resource integration by providing platforms for accessing and matching updated and enriched resources and facilitating the analysis



**Fig. B3.** Distribution based on journal quality levels.

**Table B4**

Distribution of related topics in the included article.

Topics discussed	Number of articles
VCC	103
VCD	31
VCC&VCD	31
SI	71
RI	54
SI&RI	22
VCC&VCD&SI&RI	8

and reverse use of customer data. However, firms should also consider the negative effects of IT, such as easier spreading of negative comments, security and privacy issues, technical failures, low IT quality, and system complexity.

Our research has some limitations. Like all literature reviews, the breadth of this study is limited by the research design, such as the keywords used for retrieving data. For example, VCC and VCD might also be represented by terms not included in our keyword searches, such as *customer engagement*, *co-production*, and *service failure*. We encourage other researchers to cover more potentially relevant literature using different search terms while carefully checking the relevancy based on the definition of the studied phenomenon. Moreover, although limiting the sample within the ABDC list and AJG ensures the overall quality of the included articles, it may also lead to some articles being excluded, such as conference papers and book chapters. Researchers should, therefore, consider this a trade-off when selecting literature for their studies.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Appendix B.: Overview of the sources selected

Of the 103 papers included in this study, 61 are related to marketing, 27 are related to IS, and 15 to business and management (see Fig. B.1). This distribution is roughly equivalent to the proportion of publications on VCC and VCD in these fields. Most of the included articles were published in 2019. Only few were published in 2010–2013 (see Fig. B.2). This year-based distribution of the included articles indicates the increasing attention in recent year.

The ABDC (2019) journal quality list describes four quality categories based on explicit and rigorous review processes: A\* (highest quality) and A, B, and C (lowest quality). Of the 103 papers included, 22 were published in A\* journals and 49 in A journals (cf. Fig. B.3). Including majority of high-quality articles from leading representative publications enhanced the reliability and generalizability of our findings.

Table B.4 shows the distribution of the relevant topics (VCC, VCD, RI, and SI) mentioned in the included papers. VCC was discussed in all articles, and 31 discussed both VCC and VCD. SI-related papers (71) were more than RI-related papers (54), with 22 papers discussing both. Only 8 of the 103 papers covered all four topics. Notably, though VCC, VCD, RI, and SI are evidently interrelated, minimal research has been conducted to understand their connections, which lends significance to this work.

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