




# Customers' motives to co-create in smart services interactions

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## Abstract

The paper identifies and analyses customers' motives to co-create when interacting with smart services by integrating the self-determination theory with coordination mechanisms. The study also examines the how and to what extent value co-creation impacts on word-of-mouth and customer-based brand equity. An online questionnaire was employed for empirically validating the research model. The relationships were examined using partial least square path modelling. The findings show that intrinsic and extrinsic motives are significant antecedents of value co-creation. The coordination mechanisms namely, *relating* and *knowing* also significantly influence customers' involvement in the value co-creation process. Results also show that value co-creation mediates the relationship between customers motives (intrinsic and extrinsic) to co-create and consequences. Findings of this study adds to the human–computer interaction literature by strengthening the nomological network of value co-creation when interacting with smart services by proposing a novel model integrating both the antecedents and outcomes of value co-creation. By recognizing how this practice could be motivated, service providers can bolster customer-firm interactions and enable favourable firm level consequences.

**Keywords** Value co-creation · Word-of-mouth · Motivations · Customer-based brand equity · Self-determination theory

## 1 Introduction

Value co-creation is a key construct in service research [80, 104]. It is defined as the joint value creation by a company and its customers to co-create personalized experience [84, 118]. This advancement is grounded in the evolving service-dominant (S–D) logic and the contemporary service logic (SL). According to these paradigms,

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customers are identified as co-creators of value [76]. Service providers are increasingly realizing the value of engaging customers in the process of co-creation for reciprocal benefits [4, 19]. For example, the toy maker Lego's IDEAS website requests customers to submit product designs/ideas. If a design receives over ten thousand votes, it is selected for review. Subsequently, Lego decides on the feasibility of the project [99]. Online brand communities, for instance, on social media provide an opportunity for customers to interact and jointly generate value in a co-creative way [13]. While, value co-creation is meant to benefit both customers and service firms, many organizations find difficulties in motivating customers to participate in co-creation activities [98]. That said, organizations ought to have deeper insights into motivations of customers to engage in co-creation for developing effective marketing and service design strategies [77].

Marketing and human-computer interaction research suggest that use of technology enables the value co-creation process [11, 18, 80]. The use of smart technology in value co-creation has also received significant research attention in recent times [10]. The term "smart" has been added to services (smart service) describing the use of widely accessible technologies to facilitate participation, interaction, and integration within customer experience [41]. Smart retailing refers to the technology enabled delivery of product/service information, social media reviews, discounts, and personalized shopping experience for customers [92, 93, 106]. Recent studies on human-computer interactions highlight the significance of smart technologies and smart services [e.g., 6, 94]. However, understanding the motives for value co-creation in service interactions including smart services has been subject to academic debates [3, 35, 76]. Value co-creation concept remains elusive due to the semantic debates [31] and conceptual and processual ambiguities [10]. Analysing the motivation for value co-creation can potentially address these opacities and advance the scholarship.

Value co-creation strengthens the relationships between customers and brands [49, 74, 81]. Merz et al. [72] claim that brand and value co-creation are inextricably interlinked. Customers' co-creation activities help in enhancing the brand's perceived value by differentiating it from other brands [88]. Value co-creation process also motivates customers to advocate the service firm using positive word-of-mouth [72]. Although generation of positive word-of-mouth is a key outcome of value co-creation, there is lack of research relating co-creation, customer-based brand equity (CBBE) and word-of-mouth (WOM). The aim of this study is to address this gap in the literature and thereby identifying customers' motives to engage in value co-creation process in case of smart services. In addition, the effect of value co-creation on CBBE and WOM has been examined in case of smart services.

The emphasis of existing research is on the macro and meso foundations of value co-creation [97]. The contributions of this study lie in examining the micro-foundations of value co-creation in terms of the motives of value co-creation for smart services. In the similar vein Merz et al. [72] highlight the need for more research on examining the association between value co-creation and CBBE for smart services. This indicates the measurable worth that value co-creation has in service interactions. The current study advances the understanding by strengthening the nomological network of value co-creation. The findings show that intrinsic

and extrinsic motives are significant antecedents of value co-creation. The coordination mechanisms namely, *relating* and *knowing* also significantly influence customers' involvement in the value co-creation process. Results also show that value co-creation mediates the relationship between customers motives (intrinsic and extrinsic) to co-create and consequences. In terms of practical contributions, this study is integral in conceptualising a measurable model of value co-creation directly usable by service firms in encouraging WOM.

The rest of the paper is organised as follows. First, it presents a critically assessed and synthesised literature review to develop related hypotheses. Then, it elucidates the research methodology used in this study. Subsequently, the paper presents data analysis and discusses the results. Finally, we discuss the theoretical and managerial implications along with limitations and directions for future research.

## 2 Literature review

### 2.1 Value co-creation

Service-dominant logic (SDL) with its eleven fundamental propositions forms the basis of the conceptualization of value co-creation [104]. SDL considers service as the common denominator of the marketing exchange process and customers as value co-creators. Value is created due to a range of processes and interactions involving various agents and actors (e.g., customers, technological artifacts and applications and service providers) [67]. Grönroos [43, p. 6] defines value co-creation as “joint collaborative activities by parties involved in direct interactions, aiming to contribute to the value that emerges for one or both parties”. This is consistent with the propositions of Grönroos and Voima [44] who contend that the locus of value creation is the customer-firm interaction. More recently, great attention has gone into examining the role of users in driving open innovation and co-creating service delivery models in different service sectors including health-care, travel and tourism and retailing [26].

Drawing on and extending SDL, in this study we propose that customers can co-create value because of their interactions with various actors (e.g., service firms, technology, smart objects) in the smart service context. Thus, smart services offer opportunities for resource integration which facilitates value creation. This is consistent with Ramaswamy and Ozcan's [88] proposition that in addition to interactions being the locus of value creation, individuals phenomenologically experience and co-construct their own contextualized value, through interactions with a constellation of entities, which are often facilitated by the advanced technological platforms and a nodal service firm. In addition, customers are often reframed as prosumers of services, wherein the customers act as resource integrators and value co-creators in collaboration with the service providers instead of passively consuming the services provided [27].

## 2.2 Smart services

Allmendinger and Lombreglia [5] define smart services as services which are delivered through intelligent and connected products. Smart services are also defined as “highly dynamic and quality-based service solutions that are convenient for the customer, realized with field intelligence and analyses of technology, environment and social context data (partially in real-time), resulting in co-creating value between the customer and the provider in all phases from the strategic development to the improvement of a smart service” [32 p. 3]. The intelligent components of a smart service aim to address the specific needs of individual customers, customer groups, or firms [7, 113].

The rapid growth of advanced technologies including artificial intelligence, advanced robotics, the Internet of Things, and blockchain is fundamentally transforming the nature of the customer–firm interactions [61, 69]. As such, the interest in smart services gathered momentum. The characteristics of smart services resonate the core ethos of value co-creation by facilitating the interactions between the service firms and customers. Interaction is the central concept for a better understanding and application of co-creation [43]. Thus, value co-creation is integral to smart services, wherein, service firms continuously adjust to the changing needs of customers by relying on the technology [32].

Smart services can be deemed as a significant step in the evolution of technology use in services through an effective convergence between physical and digital aspects of service provision. While traditional services emphasise primarily on the existing traditional customer touchpoints and a dyadic interaction, smart services underscore the interactions among customers, smart objects, and service providers. This type of interaction is termed as service encounter 2.0 [61]. Smart services offer efficiency gains to both the service providers and the customers by reducing costs, greater access to information and increased flexibility [5]. Despite these benefits, customers’ resistance and reluctance owing to perceived risks of smart services is purported in existing literature [23, 54, 68].

## 2.3 Smart tourism

Smart tourism is defined as “tourism supported by integrated efforts at a destination to collect and aggregate/harness data derived from physical infrastructure, social connections, government/organizational sources and human bodies/minds in combination with the use of advanced technologies to transform that data into on-site experiences and business value-propositions with a clear focus on efficiency, sustainability and experience enrichment” [41 p. 181]. The tourism system that harnesses the advantages of smart technology in the creation, management and delivery of advanced and capable touristic services and is characterized by integrative and co-creative information sharing is referred to as smart tourism services [41]. For, modern and efficient tourism, it is imperative to have smart services. Hence, smart tourism services are integral to the core strategy of tourism development [62].

It is considered as a technology centric platform which integrates the new age technologies such as artificial intelligence, robotics, and Internet of things with tourism services to provide services to tourists [107]. Smart tourism extends across three layers consisting of three components: the smart information layer which gathers data; the smart exchange layer which is responsible for providing interconnectivity; and the smart processing layer which supports data analysis and data visualization [102].

### 3 Conceptual model and hypothesis development

A new model linking value co-creation and its consequences is proposed and tested in this study. Our proposed research model includes intrinsic and extrinsic motives to co-create and coordination values including communicating, relating, and knowing. In addition, we test the relationships between value co-creation and the two factors CBBE and WoM.

Motive drives human behaviour in one form or another [90] and can be considered as an antecedent to co-creation behaviour. Customers engage in co-creation behaviour to fulfill individual needs and goals [34, 90]. This paper used self-determination theory (SDT) as an overarching theory to investigate the consumers' motives to co-create in the smart services context for a few reasons. Firstly, SDT offers a robust rationale for examining customer involvement in service development [33]. Secondly, SDT is useful in examining users' motive in multi-user virtual environments contexts, like in technology-assisted services [78, 87].

Neghina et al.[77] identified a set of customer motives that are fundamental to value co-creation. It can be seen as planned coordination, where each participant's behaviour can be seen as driven by representations of the value the participant places in the joint activity, and the participants own roles in realizing this value [58]. These series of coordinated motives are classified into three broad categories such as relating, communicating, and knowing [77]. In addition, these three constructs *communicating*, *relating*, and *knowing* are considered as fundamental to the manifestation of joint actions between the customers the service firms. These antecedents of value co-creation are consistent with the propositions of Verma et al. [105] and Yi and Gong [117]. Figure 1 shows the research model.

#### 3.1 Motives to co-create

According to SDT, people are influenced by two types of motives: intrinsic and extrinsic [30]. The former fulfills the needs of primary competence and autonomy such as the motive to do something for the sheer enjoyment or curiosity of the experience. The latter involves the role of external forces in influencing decision-making behaviour. When external influences are considered, the level of motives range from customers' amotivation to their passive compliance, onto their active personal commitment. These are dependent on the level of internalization and integration, and the level of perceived autonomy the participants' exhibit towards this outside influence.

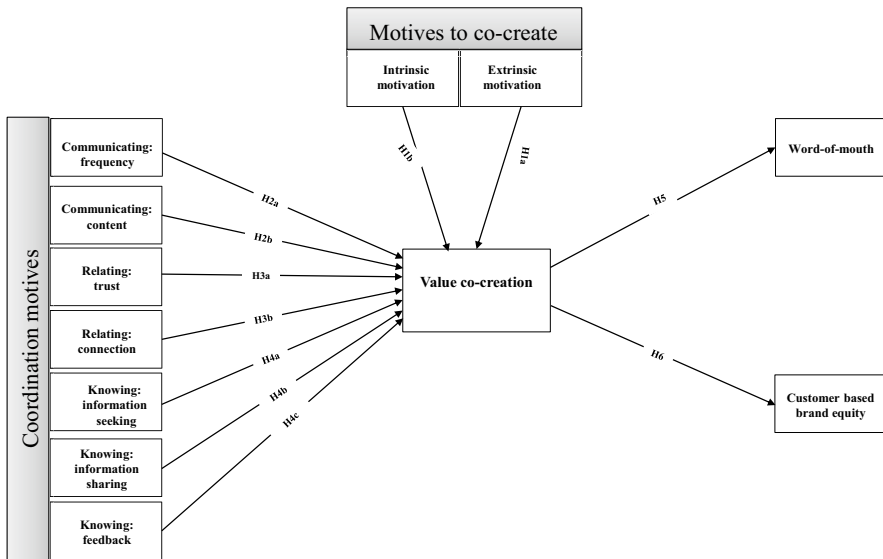


Fig. 1 Research model

For example, a customer may be intrinsically motivated to co-create in an innovation project because they derive joy from adding to the community or generating ideas [38] or extrinsically motivated by integrating the need for accomplishment or self-worth via improving the service process [33, 108]. Smart services offer a bundle of innovations which may influence customers' motive to co-create both intrinsically and extrinsically. To understand the customer motives to involve in value co-creation in smart services, we propose the following hypotheses:

**H<sub>1a</sub>** Intrinsic motive impacts value co-creation positively.

**H<sub>1b</sub>** Extrinsic motive impacts value co-creation positively.

## 3.2 Coordination motives leading to value co-creation

### 3.2.1 Communicating

Communication is one of the important elements needed for the success of the value co-creation process [12]. Prahalad and Ramaswamy [84] in their seminal article on co-creation state that “informed, networked, empowered, and active consumers are increasingly co-creating value with the firm” [84, p. 1]. Among participants, frequency and content are two aspects of communication that can influence their value co-creation behaviour [99]. The former represents the intensity of communication, as its frequency is anticipated to ameliorate cooperative actions among participants, thereby enabling a positive impact on value co-creation behaviour [103]. Further, it

helps participants understand their abilities, needs, and roles to develop a common ground onto which they can better narrate to the service provider [77]. Although communication is largely advantageous, not all communication is equally useful within joint participation. Hence, selecting the communication content and ensuring its relevance at a specific time instant is expected to improve value co-creation behaviour [77]. The appropriate content was imperative for refining participants' skills, knowledge, synchronization and coordination [58].

The incorporation of technology, as is the case in smart services, was likely to improve the frequency with which communication would be exposed to participants. The increased exposure might impact customers' reciprocal response or their cooperative actions positively, which in turn affect value co-creation positively [103]. The increased communication exchanges between the customer and the smart interface would push customers to exchange more intense information that eventually allows the participating actors to identify the resource capabilities and roles of every actor in the interaction and establish a common understanding on how they complement each other's presence.

Similarly, technology can play a greater role in customising and delivering the relevant content of the communication to a particular participant and at a particular time. Ensuring the relevance of communication content through technology support would push the customers to reciprocate with greater diligence and would suffice the goal of the interaction. Hence, it is imperative to understand the influence that different aspects of communication antecedents would leverage on value co-creation behaviour. Based on the preceding discussion, the following hypotheses are proposed:

**H<sub>2a</sub>** Frequency of communication impacts value co-creation positively.

**H<sub>2b</sub>** Content of communication impacts value co-creation positively.

### 3.2.2 Relating

Ballantyne and Varey [12] argue that the concept of relating is grounded in the notion of building social bonds in the process of value co-creation. Relationships offer structural assistance for creating knowledge since they encompass information about participants' previous interactions, personal information, and their desired style of working [77]. Trust is the confidence of one party on the reliability and integrity of another party [73]. It is considered as a vital element to build commitment in the relationship [16]. It provides value to customers by leveraging the relational benefits arising out of the interaction, promoting collaboration [73] and reducing stress and uncertainty. In addition, interpersonal trust inherent in-service co-creation interactions promote honesty, fairness, and the participant's motive to co-operate with the other party and coordinate their efforts. Connection is the other relating factor [89]. It describes emotional attachment among the participants [89]. It promotes understanding and empathy between the participants, stimulates an affective response and motivates them to collaborate in the joint activity [77]. The notion of connection may result in building familiarity,

volunteerism, and intimacy, therefore strengthening the relationship quality among participants [39]. In contrast to trust, the connection is based on affect than on cognition [89] and warrants that actor participating in co-creation activity are synchronized during the interaction.

Smart services are imbued with several key characteristics such as improved aesthetics, design, interactivity, functionality, and personalization [52]. These characteristics enable the development of better connection among consumers for the smart interface, thereby assisting co-creation practice. These characteristics also reflect how information is passed to the consumers [116]. Customers' evaluation of trust on a smart platform is influenced by their how and to what extent the functional features (e.g., promptness of response) work. In the case of smart services, participants must be able to trust the technology service providers. Similarly, the technology service provider must be able to trust the participant regarding their competence and persistence to complete their task [70]. Hence, the development of trust and emotional attachment between participants is likely to get influenced by technology imbued in the smart service.

**H<sub>3a</sub>** Trust impacts value co-creation positively.

**H<sub>3b</sub>** Connection impacts value co-creation positively.

### 3.2.3 Knowing

Knowing reflects the dimension of appraising and reflection of knowledge among participants. Knowing is argued as vital to value co-creation as it provides a common base for collaborative efforts [12]. It is argued that feedback seeking, information seeking, and information sharing are the antecedents of co-creation [117]. Information seeking is used as a tactic for stimulating information about the other participant involved in the interaction, thereby empowering participants to know their goals. Information sharing is recognized as a key element of value co-creation as it enables the successful information exchange among participants. Information sharing confirms that participants are aware of their problems and roles. Additionally, it ensures that participants can actively deliberate, negotiate, and/or coordinate among themselves during the interaction. Feedback deals with modifying knowledge bases and coordinating joint actions thereby stimulating value co-creation [95]. In the case of smart services, technology would assist in feedback mechanism, information sharing, and information seeking, and thus influencing customers' co-creation behaviour. Hence, we advance the following hypotheses:

**H<sub>4a</sub>** Information seeking has a positive impact on value co-creation.

**H<sub>4b</sub>** Information sharing has a positive impact on value co-creation.

**H<sub>4c</sub>** Feedback has a positive impact on value co-creation.



### 3.3 Value co-creation and CBBE

There is an agreement in literature on the positive impact of customer-firm interaction on brand equity. CBBE is argued to be an alternative to the traditional brand equity measurement. The four-stage "CBBE pyramid" reveals the relationship building process between customers and brands [55]. Research evidence indicates a positive relationship between CBBE and performance [53, 57]. Extant literature highlight CBBE's link with to co-creation activities [20, 51, 71] using a variety of measures such as brand image, brand perception, and brand quality.

Jamilena et al.[51] identified four dimensions of CBBE related to co-creation. These include brand awareness, image, quality, and loyalty. Keller [56] define brand awareness as the strength of brand recognition and brand presence in target audiences' mind [56] and is seen as the initial stage in creating and enhancing brand value [48]. Brand image is defined by the associations in consumers' mind about the brand [56]. Brand quality refers to the overall perception of quality and superiority relative to other brands in the customer's sphere of knowledge [51]. Brand loyalty describes the degree to which customers are committed to a brand of choice [20]. In the case of smart services, the incorporation of technology is likely to impact all four dimensions of CBBE. The technology is likely to extend brand awareness, which would leverage cascading impact on other dimensions of CBBE namely brand image, brand quality, and brand loyalty. Considering the above arguments, we propose the following hypothesis:

**H<sub>5</sub>** *Value co-creation impacts CBBE positively.*

### 3.4 Value co-creation and WOM

WOM has been identified as one of the performance metrics for firms [96, 115]. WOM is defined as "informal communications directed at other consumers about the ownership, usage or characteristics of particular goods and services or their sellers and it includes face-to-face discussions and online mentions and reviews" [14 p.1]. Traditionally, WOM has been viewed as either a pre-purchase behaviour (WOM seeking) or as a post-purchase behaviour (WOM giving) [25, 63]. For the purposes of this study, 'WOM giving' is considered as the importance of such WOM in branding and firm performance has been recognized across most marketing applications. WOM with its cognitive and rational characteristics predicts customers' buying behaviour [21] and holds a strong link with co-creation in the current literature [20] that also alludes to the relationship between intention to co-create and word-of-mouth. However, the incorporation of technology, in the case of smart services, was likely to leverage greater positive influence. Considering the preceding discussion and the empirical evidence, we advance the following hypothesis:

**H<sub>6</sub>** *Value co-creation impacts word-of-mouth behaviour positively.*

## 4 Research methodology

### 4.1 Research instrument

Table 1 shows the measurement items for the constructs in this study. The items were adapted from the existing research. These constructs are reflective in nature [46]. The items were anchored on 7-point Likert type scales, with “1 = strongly disagree” and “7 = strongly agree”. The measurement items were adapted to suit the smart tourism services setting.

### 4.2 Research context

Travel and tourism sector contributes significantly to the world economy. It contributed USD 8272.3bn in 2017 to the world economy. It is expected to grow by 3.8% pa to USD 12,450.1bn by 2028 [111]. These are highly customer-oriented service sectors where customers have acknowledged bad customer experience. Hence, customer experience management in travel and tourism is of vital urgency. Several business tactics including incorporation of technology (smart services) has made customer experience management more challenging. Taking a leap further, the industry analysts believed that travel and tourism sector needs to create, collaborate, innovate, and consistently exceed customer expectations. These rationales act as the basis for selection of tourism services as the focal context for this study.

### 4.3 Data collection

Qualtrics was used to deploy the survey questionnaire. Appendix 2 shows the hypothetical tourism scenario used in this study. In the scenario participants were requested to imagine that they are taking a 5-day holiday to Western Australia, and they come across the smart tourism application ‘Experience WA’ [101]. This application enables the users to plan their vacation in Perth, look up events nearby, find nearby tourist attractions, and share holiday plans with their friends. Each item on the questionnaire was then adapted considering the contextual settings. The items in the measurement instrument did not have the word ‘co-creation’ in them [76].

Amazon’s Mechanical Turk (MTurk) was used to collect data. MTurk allows researchers (‘Requesters’) to utilize online participants (‘Workers’) to complete ‘Human Intelligence Tasks’ (HITs), in which surveys such as the one used in this study are classified [91]. Workers are then able to browse through a list of posted HITs which they are eligible for and complete them in exchange for a small monetary reward. This monetary reward has been found not to affect the data quality when using realistic compensation rates [17]. In addition, participants on online panels have been found to represent the population demographics [17]. Results obtained through MTurk have been found to be reliable across multiple different studies [17, 91]. These findings suggest the utilization of MTurk as a viable option for participant recruitment in the current study.

**Table 1** Measurement items

Construct measurements (sources)	Items	
Value Co-Creation (VCC) (Grissmann and Stokburger, 2012)	CC_1: I would be actively involved in using 'Experience WA' while participating in this tourism experience CC_2: I would use my previous tourism experience in using Experience WA during my trip to WA CC_3: The ideas of how to use 'Experience WA' in this tourism experience would predominantly come from myself CC_4: I would like to spend a considerable amount of time organising this trip to WA by using 'Experience WA'	
Intrinsic Motivation (IM) (Nambisan and Baron, 2009)	IM_1: Using 'Experience WA' would make my time enjoyable IM_2: Using 'Experience WA' would make my time relaxing IM_3: I would derive fun from using 'Experience WA' IM_4: I would derive pleasure from using 'Experience WA' IM_5: I would entertain myself by using 'Experience WA' IM_6: I would stimulate my mind by using 'Experience WA' IM_7: I would use 'Experience WA' to derive enjoyment from problem solving and idea generation	
Extrinsic Motivation (EIM) (Nambisan and Baron, 2009)	IEM_1: I would use 'Experience WA' in hopes to expand my social network through my active participation in the experience IEM_2: I would use 'Experience WA' to try to enhance my reputation as a tourism expert in my personal life IEM_3: I would use 'Experience WA' to reinforce my tourism-related credibility and authority in my personal life IEM_4: I would derive satisfaction from using 'Experience WA' in order to influence the tourism experience for others	
Communicating (COM) (Gustafsson et al., 2012)	CFREQ_1: I would want ongoing feedback on my input from 'Experience WA' CFREQ_2: I would want to input many ideas in the 'Experience WA' app CFREQ_3: I would want to use 'Experience WA' multiple times to plan my tourism experience	Frequency (CFREQ)
	CCON_1: I would use 'Experience WA' to help me feel active in my involvement in my tourism experience CCON_2: I would use 'Experience WA' early in my tourism experience, rather than later CCON_3: I would want 'Experience WA' to inspire ideas for my holiday based on my input in this app	Content (CCON)

Table 1 (continued)

Construct measurements (sources)	Items
Relating ( <i>REL</i> ) (Randall et al., 2011; Garbarino and Johnson (1999))	RELTRU_1: I would want 'Experience WA' to always meet my expectations
	RELTRU_2: I would want to be able to count on 'Experience WA' to produce a good experience
	RELTRU_3: I would not always be able to trust the experiences 'Experience WA' produces to be good. (Reverse Coded)
	RELTRU_4: I would want 'Experience WA' to be a reliable app
	RELTRU_5: I would want the quality of the experiences from 'Experience WA' to be consistently high
Connection ( <i>REL-CON</i> )	RELCONN_1: Using 'Experience WA' would help me feel a sense of connection with the tourism destination
	RELCONN_2: Using 'Experience WA' would help me feel a sense of belonging with the tourism destination
	RELCONN_3: Using 'Experience WA' would help me become a loyal patron of this tourism destination
Knowing ( <i>KNOW</i> ) (Yi and Gong, 2013)	KNOWSEEK_1: I would ask others (e.g. social media) for information on what 'Experience WA' offered
	KNOWSEEK_2: I would search for information on where different functions of 'Experience WA' are located
	KNOWSEEK_3: I would pay attention to how others (e.g. via social media) who are using 'Experience WA' behave to guide my behavior while using this app
Information Sharing ( <i>KNOWSHARE</i> )	KNOWSHARE_1: I would have a clear plan on what I wanted 'Experience WA' to do for me when using it for planning the trip to WA
	KNOWSHARE_2: When using 'Experience WA', I would give it proper information about me
	KNOWSHARE_3: When using 'Experience WA', I would provide necessary information so that the app can guide me properly in planning my trip to WA
Feedback ( <i>FBACK</i> )	FBACK_1: I would answer all of the Experience WA's tourism related questions for planning the trip
	FBACK_2: If I had a useful idea on how to improve Experience WA, I would let the app creators know
	FBACK_3: When I have a good experience with Experience WA, I would rate it highly
	FBACK_4: When I experience a problem with Experience WA, I would let the app creators know

**Table 1** (continued)

Construct measurements (sources)	Items
Word-of-Mouth Behaviour ( <i>WOM</i> ) (Cabra-Fierro, et al., 2017; Eisingerich, et al., 2014)	WOM_1: I would say positive things about Experience WA to other people after returning
	WOM_2: I would encourage friends and relatives to use Experience WA
	WOM_3: I would recommend Experience WA to someone who seeks my advice after using the smart tourism app
	WOM_4: I would enjoy sharing my experience of using 'Experience WA' with other tourists who have visited this tourism destination
Customer Based Brand Equity ( <i>CBBE</i> )	Brand Awareness ( <i>AWARE</i> ) (Jamilena et al., 2016; Washburn and Plank, 2002)
	WOM_5: I would always give my honest opinion about Experience WA
	AWARE_1: 'Experience WA' helps WA to have a good name and reputation
	AWARE_2: 'Experience WA' helps WA to be very famous
	AWARE_3: 'Experience WA' helps the characteristics of WA to come to mind quickly
Brand Image ( <i>IMAGE</i> ) (Jamilena et al., 2016; Kayaman and Arasli, 2007)	AWARE_4: When I am thinking about having fun, 'Experience WA' would help WA come to mind immediately
	AWARE_5: 'Experience WA' would help me to be able to recognise WA with other tourism destinations
	IMAGE_1: 'Experience WA' helps WA to have a differentiated image from other similar destinations
	IMAGE_2: 'Experience WA' helps the image of WA to be as good as, or even better than, that of other similar destinations
	IMAGE_3: 'Experience WA' helps the overall image of WA to be very positive
Brand Loyalty ( <i>LOYAL</i> ) (Cabra-Fierro, et al., 2017)	IMAGE_4: 'Experience WA' helps WA to be prestigious
	IMAGE_5: 'Experience WA' helps WA to have a good reputation
	LOYAL_1: 'Experience WA' would make me want to visit WA again in the next 5 years
Brand Quality ( <i>QUAL</i> ) (Jamilena et al., 2016)	LOYAL_2: 'Experience WA' would help me not want to switch to a similar tourism destination
	LOYAL_3: 'Experience WA' would help me want to visit WA again
	QUAL_1: During my trip, 'Experience WA' would provide tourism offering of consistent quality
	QUAL_2: During my trip, 'Experience WA' would help provide quality tourism experiences
	QUAL_3: During my trip, 'Experience WA' would lead me to expect superior tourism performance
	QUAL_4: During my trip, 'Experience WA' would help me receive better tourism experience (than if I had not used it)

The pre-test was carried out with 30 undergraduate and post-graduate students to determine any confusion or ambiguity in the items and seek their feedback to improve and provide face validity to the the questionnaire. The final questionnaire design was transcribed to Qualtrics Survey Solutions. This survey was accessed through a HIT posted on Amazon's MTurk website. The landing page revealed background information of the study. Mturk has specific demographic filters (which are referred to as Qualifications), that helped us to narrow our participants to Australian workers. The information regarding the monetary reward on successful completion of the questionnaire was also provided. After participants consent, they were then asked to evaluate the 'Experience WA' smart tourism app in a hypothetical holiday scenario in Western Australia and then directed to complete the questionnaire in full.

#### 4.4 Sample profile

Participants were recruited based on whether they have holidayed in the past 6 months, which is validated within the questionnaire. In all 315 respondents completed the survey. Of these 315 respondents, 293 indicated that they had used smart tourism services in the past 6 months. The respondents who indicated that they had not used smart tourism services in the recent past were screened out of the analysis [79]. The remaining 293 sample respondents consisted of 56% males and 43% females, with 1% preferring not to say. Regarding age, most of the respondents were between 25 and 44 years of age. Of the sample, 46% of respondents held an undergraduate degree, followed by 25% holding a postgraduate degree. A summary of the sample profile is shown in Table 2.

### 5 Data analysis and results

- (i) The measurement model and the structural model were tested using IBM SPSS 22.0 and partial least square path modelling (PLS-PM) using WarpPLS 6.0 [59]. PLS-PM is used in this study because of the following reasons: (i) PLS-PM is better suited for theory development and an appropriate method due to non-normal data distribution, and the exploratory nature of this study [47], (ii) the statistical power of PLS-PM is higher than the covariance-based structural equation modelling (CB-SEM) [48]. (iii) PLS-PM is recommended when the focus of the study is prediction, and the model is complex in nature [47].

Since the data was collected from a one source at a particular point in time, it was possible that common method bias (CMB) could impact the measured relationships between the constructs. Harman's one-factor test was used to examine of common method bias. By fixing the factor extraction to one, the total variance explained was only 36.7, which is less than the threshold [83]. Given the criticisms against the efficacy of Harman's one-factor test for controlling for CMB, we also used a common

latent factor that is linked to all measurement items to detect CMB. The results suggest that CMB is not a major concern in this study.

### 5.1 Measurement model

For the travel and tourism context [51] CBBE has been conceptualized and modelled as a reflective higher-order factor with brand awareness (hereafter, *Aware*), brand image (hereafter, *Image*), destination brand loyalty (hereafter, *Loyal*), and brand quality (hereafter, *Qual*) as first-order factors [45]. The high correlation between the first-order constructs and the second order CBBE construct (shown in Table 3) signifies appropriateness in considering CBBE as second-order construct. The path coefficients between the first order constructs to the second order CBBE construct are all substantial and significant ( $\beta$  *Aware* = 0.89,  $p < 0.01$ ;  $\beta$  *Image* = 0.89,  $p < 0.01$ ;  $\beta$  *Loyal* = 0.82,  $p < 0.01$ ;  $\beta$  *Qual* = 0.84,  $p < 0.01$ ). In addition, the  $R^2$  values for all the first order constructs ( $R^2$  *Aware* = 0.80;  $R^2$  *Image* = 0.79;  $R^2$  *Loyal* = 0.67;  $R^2$  *Qual* = 0.70) were high. All the above significant metrics signify the reliable conceptualization of CBBE as a second-order construct with 4 first-order reflective constructs, namely *Aware*, *Image*, *Loyal* and *Qual*.

Convergent validity of the measurement model was tested by examining the factor loadings and average variance extracted (AVE) [24, 36]. Results show that the factor loadings of all the measurement items are greater than 0.7 at  $p < 0.01$ .

The composite reliability of all the constructs is greater than 0.7, with values between 0.78 for value co-creation and 0.94 for extrinsic motive. The AVE for all the constructs were above 0.5 except for the value co-creation construct. It implies that on average all the constructs explained more than 50% of the variance of its items [45], establishing convergent validity across the constructs. Additionally, all constructs exhibited Cronbach's alpha values of above 0.7 with value co-creation and information seeking as exceptions having values 0.61 and 0.68 respectively. Cronbach's alpha tends to be sensitive to the number of items in the scale and has a general tendency to underestimate the internal consistency reliability [45]. Hence, CR and AVE are better measures of reliability and validity (shown in Table 4). Discriminant validity is measured by comparing the square root of the AVE values with the latent variable correlations. The requirements are met by all constructs (shown in Table 5), indicating adequate discriminant validity in this model.

### 5.2 Testing the structural model

The proposed hypotheses were tested by assessing the structural model and investigating the beta coefficients,  $p$ -values, and variance explained (i.e.,  $R^2$  values). Warp-PLS's quasi-parametric 'Stable3' method recommended by Kock [60] was used to produce stable coefficients and fairly accurate  $p$ -values for structural equations. Control variables used in the data analysis are age and experience with the use of smart technology to ensure respondent heterogeneity. Controlling for these variables can improve the generalizability of the research findings [119]. Results indicate that the

control variables did not affect CBBE significantly. There was no significant difference between the explained variance ( $R^2$ ) of CBBE with- ( $R^2=0.40$ ) and without- ( $R^2=0.38$ ) the control variables (F-square=0.02) [1].

An  $R^2$  value of 0.52 for value co-creation construct infers that 52% of the variance found in this endogenous construct can be explained by the exogenous constructs linked to it [46, 50]. Further,  $R^2$  value of 0.31 for WOM and  $R^2$  value 0.40 for CBBE reveals the respective variance explained by value co-creation on these constructs [46, 50]. The  $R^2$  values of all the constructs were greater than the cut-off value of 0.30 [40] which indicates good explanatory power of this research model. The path coefficient of intrinsic motive ( $\beta=0.39$ ,  $p<0.01$ ) and extrinsic motive on value co-creation ( $\beta=0.23$ ,  $p<0.01$ ) are significant, thereby supporting  $H_{1a}$  and  $H_{1b}$ . The path coefficients from both the aspects of *communication* motive namely communicating frequency ( $\beta=-0.02$ ,  $p=0.40$ ), and communicating content ( $\beta=0.05$ ,  $p=0.23$ ) were not found to be statistically significant in influencing value co-creation behaviour. Hence,  $H_{2a}$  and  $H_{2b}$  are not supported. On the contrary, both aspects of *relating* motive namely trust ( $\beta=0.13$ ,  $p<0.05$ ) and connection ( $\beta=0.17$ ,  $p<0.05$ ) were statistically significant in influencing value co-creation behaviour. Hence,  $H_{3a}$  and  $H_{3b}$  are supported. The third type of motive namely *knowing* was partially significant in influencing value co-creation behaviour. The path coefficients from information seeking ( $\beta=-0.03$ ,  $p=0.33$ ) and feedback ( $\beta=0.06$ ,  $p=0.22$ ) to value co-creation are not significant. Hence,  $H_{4a}$  and  $H_{4c}$  are not supported. However, the significant path coefficient of information sharing ( $\beta=0.13$ ,  $p<0.05$ ) on value co-creation supported  $H_{4b}$ . Lastly, the path coefficients from value co-creation to WOM ( $\beta=0.43$ ,  $p<0.01$ ) and CBBE ( $\beta=0.52$ ,  $p<0.01$ ) are significant, thereby supporting  $H_5$  and  $H_6$ . The results of the hypotheses testing are summarized in Table 6.

Intrinsic motive contributes most to the R-square of value co-creation (50%), followed by the two relating motives (i.e., trust and connection) which contributed 12 and 19% respectively to value co-creation [100]. Apart from coefficients of determination, measuring the effect size of the model is another recommended metric [45, 60]. In WarpPLS 6.0, the 'effect size' is measured using a similar procedure to Cohen's [28]  $f^2$  coefficient. This effect size measures the absolute contributions of corresponding predictor latent variables in each latent variable block [60] and can ascertain whether the effects indicated by path coefficients are small ( $<0.02$ ), medium (0.15), or large (0.35) [28]. All significant relationships have effect sizes over 0.02 and are considered appropriate [60]. The effect size on value co-creation from intrinsic motive was in medium range having value equaled to 0.26. The effect size on value co-creation from both the aspects of relating motive was small with values varying from (0.06) for trust and (0.10) for connection. Similarly, the effect size on value co-creation from all the three aspects of knowing motive was small with values between 0.02 and 0.07. The effect size for value co-creation and WOM was in medium range (0.18), whereas for CBBE, the effect size was large (0.37).

The Stone-Geisser  $Q^2$  value is used in addition to  $R^2$  and effect size values while examining the predictive accuracy [45, 60]. All  $Q^2$  values in this study are positive indicating acceptable predictive validity in the endogenous variables in the research model. Furthermore, the Tenenhaus et al. [100] Goodness of Fit (GOF) measure was



**Table 2** Sample profile

Variable	Description	Frequency	Percentage
Total respondents		183	100%
Age			
	18–24	19	10%
	25–34	84	46%
	35–44	50	27%
	45–54	18	10%
	55 +	12	7%
Gender			
	Male	103	56%
	Female	78	43%
	Prefer not to say	2	1%
Education level			
	High school	39	21%
	Diploma (post-high school)	11	6%
	Some college	3	2%
	Undergraduate	84	46%
	Postgraduate	46	25%

**Table 3** Correlations between first order CBBE variables

	AWARE	IMAGE	LOYAL	QUAL	DBE
AWARE	1.00				
IMAGE	0.79	1.00			
LOYAL	0.62	0.59	1.00		
QUAL	0.63	0.64	0.61	1.00	
DBE	0.89	0.88	0.82	0.84	1.00

0.49 which indicates the overall explanatory power of the model. This is above the threshold for large explanatory power of 0.36 [110].

**5.3 Post-hoc mediation analysis (value co-creation as a mediator)**

We conducted further analysis to test the mediation role played by co-creation between customers' motives (intrinsic and extrinsic motives) and the outcome variables (i.e., CBBE and WOM). Bootstrapping procedure of Preacher and Hayes [85] was used to test the mediation effect. According to this method if zero is not included in the bias corrected confidence intervals (CI) for the indirect paths, then the indirect effect is significant. Results shows that value co-creation mediates the relationship between intrinsic motivation and CBBE ( $\beta_{indirect} = 0.19$ ;  $CI = 0.09, 0.3$ ) and WOM ( $\beta_{indirect} = 0.15$ ;  $CI = 0.07, 0.23$ ). Results also show that value co-creation is a mediator between extrinsic motive and CBBE and WOM as the indirect effects

between respective constructs are not significant (only direct effects are significant in Table 6). The indirect effects between coordinating motives i.e., relating (trust and connection) and knowing (information sharing) and CBBE and WOM are not significant. Hence, based on the results of direct effects shown in Table 6 and non-significant indirect effects we conclude that value co-creation mediates relating (trust and connection) and knowing (information sharing) motives and CBBE and WOM.

## 6 Discussion

This study's main purpose was to identify customers' motives to co-create value through engagement with smart services; and test the relationships between value co-creation, WOM and CBBE. Our results provide meaningful insights into the motives for customer participation in value co-creation using smart tourism services. Furthermore, our results show a positive effect of co-creation on CBBE and WOM.

Our findings reveal that the many of our proposed hypotheses were supported, providing empirical support for our hypothesised relationships between intrinsic motives and value co-creation, extrinsic motives, and value co-creation, relating (trust) and value co-creation, relating (connection) and value co-creation, information sharing and value co-creation. These findings support the findings of prior research emphasising the significance of these factors [e.g., 38, 33, 108, 52, 12]. Overall, the results show the significance of the three coordination motives leading to value-co-creation: communicating, relating, and knowing. In addition, our findings support our hypothesised relationships between value co-creation and WOM and value co-creation and CBBE in which we extend the findings of prior research in this area [e.g., 20, 51, 42]. In addition, our analysis shows that some of the hypotheses have not been supported. Hence, our assumption that a relationship exists between communication frequency and value co-creation, communication content and value co-creation, knowledge seeking, and value co-creation and knowledge feedback and value co-creation has not been supported.

While previous studies highlighted the significance of frequency and content in communication as major aspects of communication in relation to value co-creation [e.g., 105, 103, 77], our findings show that these two factors do not have any significant effects of value co-creation. This may be explained by differences in context, where this study focuses on customer-provider interaction through smart tourism services. The context of this study used a specific smart tourism app where customers looked up information in their own time, with no initiative taken by the app itself. This may have affected the impact of both communication frequency and content, as customers may have felt less need to have a high frequency of communication with the device. Another alternative is that consumers may have felt 'burnt' by previous disruptive app usage. A study by Westermann et al. [109] reveals that a high frequency of notifications and thus unsolicited communication with smart

**Table 4** Measurement model results

Construct	Items	Factor Loading	Composite Reliability	Cronbach's Alpha	AVE
CC			0.78	0.61*	0.47*
	CC_1	0.79			
	CC_2	0.68			
	CC_3	0.60			
	CC_4	0.65			
IM		0.93	0.91	0.64	
	IM_1	0.75			
	IM_2	0.80			
	IM_3	0.84			
	IM_4	0.84			
	IM_5	0.85			
	IM_6	0.80			
	IM_7	0.73			
IEM			0.94	0.92	0.81
	IEM_1	0.86			
	IEM_2	0.95			
	IEM_3	0.92			
	IEM_4	0.89			
CFREQ			0.86	0.74	0.67
	CFREQ_1	0.87			
	CFREQ_2	0.90			
	CFREQ_3	0.67			
CCON			0.84	0.72	0.64
	CCON_1	0.78			
	CCON_2	0.79			
	CCON_3	0.83			
RELTRU			0.86	0.79	0.57
	RELTRU_1	0.79			
	RELTRU_2	0.82			
	RELTRU_3	0.34			
	RELTRU_4	0.85			
	RELTRU_5	0.84			
RELCONN			0.91	0.86	0.78
	RELCONN_1	0.87			
	RELCONN_2	0.90			
	RELCONN_3	0.87			
KNOWSEEK	0.83	0.68*	0.61		
	KNOWSEEK_1	0.82			
	KNOWSEEK_2	0.72			
	KNOWSEEK_3	0.81			

**Table 4** (continued)

Construct	Items	Factor Loading	Composite Reliability	Cronbach's Alpha	AVE
KNOWSHARE		0.86	0.76	0.68	
	KNOWSHARE_1	0.67			
	KNOWSHARE_2	0.89			
	KNOWSHARE_3	0.89			
FBACK			0.87	0.80	0.63
	KNOWFBACK_1	0.76			
	KNOWFBACK_2	0.86			
	KNOWFBACK_3	0.69			
	KNOWFBACK_4	0.86			
WOM			0.90	0.85	0.64
	WOM_1	0.86			
	WOM_2	0.89			
	WOM_3	0.87			
	WOM_4	0.80			
	WOM_5	0.52			
CBBE			0.92	0.88	0.74
	lvAWARE	0.89			
	lvIMAGE	0.87			
	lvLOYAL	0.82			
	lvQUAL	0.84			
AWARE			0.91	0.88	0.68
	AWARE_1	0.77			
	AWARE_2	0.83			
	AWARE_3	0.88			
	AWARE_4	0.85			
	AWARE_5	0.80			
IMAGE			0.93	0.91	0.73
	IMAGE_1	0.83			
	IMAGE_2	0.86			
	IMAGE_3	0.87			
	IMAGE_4	0.83			
	IMAGE_5	0.89			
LOYAL			0.91	0.86	0.78
	LOYAL_1	0.91			
	LOYAL_2	0.82			
	LOYAL_3	0.92			
QUAL			0.90	0.86	0.70
	QUAL_1	0.86			
	QUAL_2	0.85			
	QUAL_3	0.80			
	QUAL_4	0.84			

\* indicates that these values are slightly lower than the cut-off values of alpha and AVE

**Table 5** Discriminant validity

	1	2	3	4	5	6	7	8	9	10	11	12
1 CC	<b>0.75</b>											
2 IM	0.65	<b>0.80</b>										
3 IEM	0.37	0.57	<b>0.91</b>									
4 CFREQ	0.39	0.52	0.55	<b>0.82</b>								
5 CCON	0.56	0.65	0.39	0.47	<b>0.80</b>							
6 RELTRU	0.47	0.44	0.09	0.21	0.57	<b>0.83</b>						
7 RELCONN	0.58	0.72	0.62	0.55	0.59	0.38	<b>0.88</b>					
8 KNOWSEE	0.36	0.45	0.42	0.41	0.42	0.33	0.48	<b>0.78</b>				
9 KNOWSHA	0.49	0.46	0.31	0.44	0.58	0.51	0.45	0.45	<b>0.82</b>			
10 FBACK	0.49	0.52	0.46	0.57	0.53	0.48	0.60	0.53	0.62	<b>0.80</b>		
11 WOM	0.43	0.46	0.27	0.25	0.47	0.42	0.51	0.40	0.45	0.50	<b>0.86</b>	
12 DBE	0.61	0.77	0.55	0.52	0.58	0.44	0.71	0.43	0.52	0.61	0.57	<b>0.86</b>

AVE scores shown in **bold** on the diagonal

**Table 6** Results of hypothesis testing

Hypothesis	Relationship	Path Coefficient	<i>p</i> -value	Validation
H <sub>1a</sub>	IM → VCC	0.39	<0.01	Supported
H <sub>1b</sub>	EM → VCC	0.23	<0.001	Supported
H <sub>2a</sub>	CFREQ → VCC	-0.02	0.40	Not supported
H <sub>2b</sub>	CCON → VCC	0.05	0.23	Not supported
H <sub>3a</sub>	RELTRU → VCC	0.13	<0.05	Supported
H <sub>3b</sub>	RELCONN → VCC	0.17	<0.05	Supported
H <sub>4a</sub>	KNOWSEEK → VCC	-0.03	0.33	Not supported
H <sub>4b</sub>	KNOWSHARE → VCC	0.13	<0.05	Supported
H <sub>4c</sub>	FBACK → VCC	0.06	0.22	Not supported
H <sub>5</sub>	VCC → WOM	0.43	<0.01	Supported
H <sub>6</sub>	VCC → CBBE	0.61	<0.01	Supported

apps may cause frustration and stress in the user base, resulting in reduced want for communication by the device. This previous usage may give preconceptions outside of the specific apps, explaining the inconsistencies in significance of the constructs used in this study. Similarly, the findings show that there are no relationships between knowledge seeking and value co-creation and knowledge feedback and value co-creation. This is not consistent with the conclusions of previous studies by Ballantyne and Varey [12] and Yi and Gong [117]. This may be explained by an outside variable such as mastering, explored in a recent study on tourist co-creation and satisfaction by Prebensen and Xie [86]. This construct measured participant's perceived skills and masteries and was found to have a statistically significant

impact on their perceived value. As value co-creation is driven by individual needs and goals [90], a lower need for knowledge seeking and feedback or criticism of systems, due to perceived mastery of the systems, may explain the non-significance of these constructs in the study.

## 6.1 Theoretical contributions

The results of this study add to the human–computer interactions literature in several ways. Research till date on value co-creation focused primarily on the macro-foundations [66] and/or meso-foundations [2]. This is one of the few initial studies which examine the micro-foundations of the interactions between customers and service providers. More specifically this study identifies the micro-foundations of value co-creation in terms of customers' motives to co-create value with smart services. Thus, our study moves beyond the metaphorical view of co-creation, a banal perspective in the current literature [20, 43].

The results vary from the established literature on the application of smart technology in services context which are purely conceptual and/or qualitative [41, 113, 114]. Despite its importance and increasing popularity, empirical studies in smart services are in its infancy. Therefore, this study bridges this gap by empirically evaluating the customers' perceptions of smart services (e.g., smart tourism services in this study). Moreover, it answers the calls for future research exploring 'smart services' [15].

This study proposed and tested a model of customers' co-creation of value with smart services. Specifically, it determines how consumers' motives (e.g., intrinsic and extrinsic motives) and coordination motives (e.g., relating, communicating and knowing) influences value co-creation. In doing so this study provides a unique perspective on value co-creation for smart services [32]. By identifying the relationship between consumers' motives and value co-creation we extend the work in this area by Nambisan and Baron, [75] and Neghina et al. [77].

Our next contribution emanates from the positive relationship between value co-creation, CBBE and WOM. This is a welcome addition to the literature as this extends the existing knowledge which conceptually identifies the all-important linkage between co-creation and brand equity [72]. The paper also identifies measurable consequences for value co-creation, in response to the resounding call, stated in the existing literature [20, 42, 51].

## 6.2 Managerial implications

Understanding the enablers and consequences of value co-creation is integral to implementing customer-firm joint-action activities. This is specifically essential in

the era of experience-driven service interactions where positive experiences are critical in deriving value for both customers and firms. The practice of value co-creation has been cited as the “next source of competitive advantage for service providers in the twenty-first century” [77, p. 236]. Hence, by recognizing how this practice could be motivated, service providers can bolster customer-firm interactions and enable positive brand consequences.

The significant impact of intrinsic and extrinsic motives to positively influence value co-creation behaviour extends extensive implications for smart service providers. The smart service providers need to understand the co-creator's needs and wants outside the normal exchange process. Specifically, the smart service providers could create an enjoyable environment, present novelties, and encourage the curiosity of intrinsically motivated customers to act as co-creators. Similarly, strengthening the financial paybacks and improved socialization could be some of the attractive extrinsic motives employed by the service providers to encourage customer's engagement in value co-creation behaviour.

The smart tourism service providers may leverage the only significant coordination mechanism antecedents proposed in this study to prepare the service offerings better. For instance, the results reveal that trust in technology motivates consumers to participate in co-creation activity. Consumers' trust in the technology results from their evaluation of system features. Hence, further improving the smart tourism application from the technology perspective could build consumer trust. Usability, competence, and appearance of the technology are significant in calibrating consumer trust in the technology. Hence, the managers may work towards improving aesthetics, design, interactivity, personalization, and functionality of the smart interface to develop consumer trust. The study results reveal that connection, described as an emotional attachment with the smart interface, positively affect consumers' motivation to co-create. The managers may borrow an insight from the fundamentals of attachment theory which highlights the role of brand trust in developing an emotional attachment. Hence, investments in satisfaction programs, complaint handling mechanism, responsive attitude and behaviour of the smart tourism application provider would generate security, reliability among co-creators and assist in developing brand trust. Results reveal that information sharing has a positive impact on customers' motivation to co-create. Interactive activities, such as service contests, may be used to motivate customers to participate in terms of information sharing. Additionally, establishing a conducive climate for information sharing could be an important tactic to promote value co-creation activity. Finally, the results offer empirical evidence regarding the antecedent effect of value co-creation on CBBE and WOM behaviour. This recommends that if smart tourism application managers desire to achieve improved levels of CBBE and WOM, they can accomplish this by executing a strategy focused on motivating consumers to participate in co-creation activity. The improved levels of CBBE and

WOM would have a cascading impact on other metrics which are integral to a firm's success [51, 53].

## 7 Limitations and directions for future research

This study like others has its limitations. Firstly, in this study participants were filtered out based on whether they had used smart tourism technology in the past 6 month period. This has the potential to lead to self-selection bias, where a true representation of the consumer population may be distorted by selection rules. Thus, the study should only be interpreted as indicative of users who have co-created using the service before, where new or out-of-practice users may have different behaviours regarding value co-creation. Secondly, this study was carried out utilizing the Australian Mturk workers' attitudes towards value co-creation which differ in Eastern cultures using a text-based scenario, where the increasing digitization of services may be lacking in comparison to the Western service experience. This may provide an avenue for future research prospects utilizing an experimental design, with a focus on differences between cultures and how this may affect the value co-creation process proposed here, especially in relation to smart services such as the smart tourism services identified in this study.

A recent study by Cambra-Fierro *et al.* [20] highlighted a small but significant difference in co-creation behaviour between age and gender demographics. Thus, future research should examine the differences between value co-creation behaviour among various demographic categories, including age, gender, and other variables such as income, education, and customer resources, among others. Future research can also examine the relationship between motives to co-create and different forms of customer engagement for artificial intelligence (AI)-enabled services [64]. This may tease out different configurations of motives which leads to customer engagement with AI-enabled services in the post-COVID era [65]. Another limitation presented itself in the choice of the context within this study. The study was restricted to a single destination choice using a single smart tourism app as context, and any pre-existing perceptions of both contextual aspects may have played a role in the data that was collected by participants. Future research should build upon this study by including control variables such as previous usage behaviour and preconceptions of the tourism context and expanding to wider service contexts outside of smart tourism.

## Appendix 1

See Table 7.



**Table 7** Select studies on motives to co-create

Authors	Context	Objective	Methods	Key Findings
Frasquet-Deltoro [37]	Fashion retail	Antecedents and outcomes of virtual customer co-creation behaviours	n = 800, Structural equation modelling	Virtual co-creation behaviours are driven by: Perceived ease-of-use of the co-creation platform, Electronic word-of-mouth (e-WOM) quality Fashion involvement
Wu et al. [112]	Social networking sites	Understand the impact of firm and individual factors in influencing online co-creation	n = 700, Structural equation modelling	Co-creation is influenced by: Identification with Social networking sites, Social networking sites relationship quality
Neghina et al. [76]	Professional service	Examine consumer co-creation motive in professional and generic services	n = 284, Structural equation modelling	Motives to co-create: Development motive, Empowerment motive, Individualizing motive, Relating motive, Ethical motive Concerted motive
Pera et al. [82]	Universal exhibition (expo 2015)	Examine motives for value-creation in multi stakeholder system	Case study research design	Motives to participate in such multi-stakeholder value co-creation: Reputation motive, Experimentation motive Relationship motive
Zhu et al. [120]	Online brand communities	Examining how social support influences customer citizenship behaviour	n = 328, Structural equation modelling	Motives to engage: Informational support, Social support Satisfaction with firm

Table 7 (continued)

Authors	Context	Objective	Methods	Key Findings
Constantinides et al. [29]	Social media	Examine customer motives and benefits for participating in online co-creation activities	Latent segmentation analysis	Customer participation in co-creation is motivated by four distinct benefits: Learning benefits, Social integrative, •Personal integrative •Hedonic benefits
Chandler and Chen [22]	Crafts making	Examine prosumer motives to participate in co-creation	Grounded theory	Co-creating customers differ in their motivation level Motives to participate in co-creation is impacted by: Individual factors, Social factors
Anaza [8]	e-retail	Understanding psychological rationale behind customer citizenship behaviour	N = 155, Structural equation modelling	Antecedents of co-creation: Empathic concerns and satisfaction with firm
Roberts et al. [90]	Video Games	Understanding motives to engage in co-creation	Interviews	Motives to co-create: Hedonic motive, Personal development motive, Altruistic motive, Social motive Economic motive

Table 7 (continued)

Authors	Context	Objective	Methods	Key Findings
Anaza and Zhao [9]	e-retail	Understanding antecedents of online customer citizenship behaviour	n = 186. Structural equation modelling	Antecedents of customer citizenship behaviour: Facilitating conditions, e-store familiarity, Satisfaction with firm, Commitment to firm, Loyalty to firm
Fuller [38]	Jewellery	Examining the antecedents of co-creation influence	Expert/jury voting process, online survey (n = 174), and log file analysis. Structural equation modelling	Antecedents of co-creation experience: Autonomy, Enjoyment, Competent experience, Perceived sense of community
Nambisan and Baron [75]	Online forums of Microsoft and IBM	Examine customer co-creation motivations in firm-hosted online forums	n = 152. Structural equation modelling	Motives for e-participation include: Cognitive Social integrative Personal integrative Hedonic benefits

## Appendix 2

You are tasked with evaluating ‘Experience WA’, a smart tourism app, while participating in a tourism experience in Western Australia.

Your holiday is coming. You intend to take a five-day long trip to Perth, Western Australia. You come across ‘Experience WA’, a smart tourism app that can augment your tourism experience in Perth. ‘Experience WA’ gives you location-based information on your surroundings and can be used to plan your vacation in Perth, look up events nearby, find nearby tourism attractions, and share your holiday plans with your friends. You can use ‘Experience WA’ to search for information and plan your trip in Perth.

‘Experience WA’ can be found at the following links:

Google Play Store.

Apple App Store.

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### Declarations

**Conflict of interest** We have no conflict of interest to declare for this study.

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