

Firms' adoption of self-service technology: how managerial beliefs shape co-production decisions

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Abstract The level of service co-production offered to customers through self-service technologies (SSTs) is an important marketing decision. The extant literature reports numerous benefits of SSTs for firms, such as increasing efficiency, reducing costs, boosting loyalty, and reaching new customer segments. However, industry evidence suggests that firms vary in their adoption of SSTs. This article utilizes a managerial cognition perspective to relate the level of SST-based co-production to configurations of beliefs about desired organizational outcomes, customers, and knowledge. The resulting belief model illuminates why firms vary in their utilization of SSTs, and has implications for the judgment of newness of SST-based services, the ethics and politics of customer representation in SST design, and epistemologies of SST-based market exchanges.

Keywords Self-service technology · Co-production · Competing values · Managerial cognition · Organizational configuration · Customer representation · Epistemological beliefs

Self-service technologies (SSTs) are technological interfaces that enable customers to co-produce a service without employee involvement (Meuter et al. 2000). Varying levels of SST-enabled co-production can be offered to customers through different SSTs. For example, supermarkets can offer customers the ability to check items out of the store themselves, to only check item prices during shopping, or neither. As the

level of co-production can influence customers' service experience (Harrison and Waite 2015), the choice of level is an important managerial decision.

The SST literature to date has neglected the import of this decision, possibly because the benefits of SSTs are so numerous that it is assumed that firms want to reap them. SSTs reportedly help firms increase efficiency, enhance customer service, reduce labor costs, improve customer satisfaction, boost loyalty, reach new customer segments, and drive revenues (Bitner et al. 2002; Huang and Rust 2013). As Meuter et al. (2005, p. 61) write, “[t]he lure of incorporating technology into the service interaction can be tremendous” and “the potential financial benefits of successful technology incorporation are enticing ...”.

But if the benefits of SSTs are so numerous, why don't all firms reap them? For example, if hotel self-checkin kiosks are “..quick...efficient... labour saving...brilliant...[W]hy are so few hotels adopting [them]?” (Dennington 2015). Why did McDonald's quick service restaurant offer online ordering in 2013 (Evigo 2014), when Papa John's quick service restaurant offered the same in 2001 (Odesser-Torpey 2015)? Why did only two-thirds of credit unions use or plan to use personal teller machines, self-service terminals, or kiosks in 2012 (Coville 2013)? Why does one retail mattress store (Hassless Mattress) offer only technology assistance (i.e., no sales assistants), when other mattress retailers hire in-store salespeople to assist customers (Retail Customer Experience 2015)? Why does one librarian lambaste self-scanners as robbing libraries of their unique quality of human touch, degrading customer service (Berry 2004), while another librarian lauds them for enhancing customer service and securing a library's future (McDonough 2004)?

Each of these questions echoes a larger, more general question: “why do firms facing similar situations respond differently – particularly in the way they seize or fail to seize upon

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the strategic implications of technological innovations?” (Ginsberg and Venkatraman 1992, p. 37). Across many industries and technologies, researchers have observed that firms vary in the degree to which they adopt a technology’s functionality. For example, manufacturing firms vary in their utilization of advanced manufacturing technology functionality, from automation of routine tasks to customization to customer needs (Zammuto and O’Connor 1992); engineering firms vary in their utilization of computer-aided design functionality, from supporting existing work practices to integrating different functions (Löwstedt 1993); and tax-preparation businesses vary in whether they avoid or adopt electronic tax filing (Ginsberg and Venkatraman 1992).

Managerial cognition researchers utilize schema theory to explain why organizations respond differently to the same situation. This theory posits that decision-makers actively construe aspects of their environment (e.g., events, people, technologies) through the use of schemas – cognitive structures that represent knowledge about concepts or types of stimuli, including their attributes and relationships among attributes (Fiske and Taylor 1991, p. 98). Schemas act as implicit guidelines for organizing and shaping interpretations of organizational phenomena and the meanings ascribed to them (Weick 1979). (These schemas have been described using various terms, such as “mental models”, “interpretive schemes”, “frames”, and “belief structures” (Walsh 1995); this article uses the term “belief model”). Thus, managers in different organizations construct different interpretations of the same environmental stimuli, and these interpretations affect which stimuli they will attend to, which they will ignore, and which they see as being important for their firms (Thomas and McDaniel 1990).

Schemas also guide the actions managers take in response to organizational phenomena (Bartunek 1984). In particular, when managers make decisions about technology,¹ their beliefs and assumptions about the world are incorporated into those decisions (Bostrom and Heinen 1977; Weick 1990). Technologies that aim to solve business problems are not deterministic, permitting only one form of work organization or job structure; rather, they allow for many different forms. The choice of form depends in part on the managers’ worldview of firm and users (Hedberg and Mumford 1975). Zuboff (1985, p. 150) echoes this point, writing that “... information technology provides a particularly flexible set of technical possibilities, and thus can powerfully embody the assumptions and goals of those whom it is designed to serve”.

This article uses a managerial cognition perspective to show how managerial beliefs influence one particular

¹ Technology can be defined narrowly as electronic and computer products and systems (e.g., an SST machine), or defined broadly, as in Capon and Glazer (1987), as product-, process- and managerial/administrative know-how (e.g., SST-based service delivery). Unless otherwise specified, when this paper refers to technology, it is alluding to the broad definition.

technology decision: the level of SST-enabled co-production. The literature points to some managerial considerations that may influence SST adoption decisions. Some scholars note that firms vary in their reasons for offering SSTs, such as to enhance customer satisfaction or to reduce labor costs (e.g., Bitner et al. 2002; Huang and Rust 2013), or vary in their views of customers using SSTs, such as seeing them as operand or operant resources (Hilton and Hughes 2013). These SST writings, however, do not directly tie these reasons or views of customers to the level of SST-enabled co-production. Co-production scholars have put forward factors that relate directly to co-production levels and can be applied to SST-enabled co-production, but most do so from the perspective of academic onlookers describing factors that *should* matter, such as productivity and efficiency gains (e.g., Lovelock and Young 1979; Trinh et al. 2014), marketing benefits (Bowen 1986), transaction costs (Bowen and Jones 1986; Song and Adams 1993), and degree of service provider monopoly of knowledge (Chervonnaya 2003).

With the exception of Hilton and Hughes (2013), the above writings treat these considerations as if they are hard, tangible entities with objective properties – from a realist perspective in Burrell and Morgan’s (1979) sense – rather than as beliefs and assumptions that may be shared and taken for granted within the firm. For example, in the case of provider monopoly of knowledge, which refers to whether or not the source of knowledge required to produce the service is located within the firm, Chervonnaya (2003) writes that “... some parts of service-specific knowledge can eventually lose its “producer monopoly” status” (p. 359). This connotes that knowledge has an objective property of being sourced within the provider; however, beliefs about the source of knowledge have long been known to vary among individuals (Perry 1968).

This article takes a more interpretive perspective than previous studies to show that varying *beliefs* about certain characteristics of SSTs lead to varying levels of independence offered to customers. The next section will show how certain SST-related beliefs are tied to preferred level of SST-enabled co-production. The article concludes by discussing the implications for: (i) judgment of newness of SST-based services; (ii) the ethics and politics of customer representation in SST design; (iii) epistemologies of SST-based market exchanges; and (iv) SST design practice.

The SST belief model

Following Finkelstein and Hambrick (1996), this article distinguishes between the content and the structure of a managerial belief system. A manager’s belief content consists of “... things he or she knows, assumes or believes” (p. 57), while belief structure describes how the content is arranged or connected. This section will propose that the content of an SST

belief model comprises beliefs about desired organizational outcomes, customers, and knowledge, and that these beliefs are structured as configurations, with different configurations cohering with different levels of SST co-production.

The content of the managerial SST belief model

The SST belief model is based on beliefs about three characteristics of SSTs. One characteristic is that SSTs are designed to achieve certain organizational outcomes, which brings into play beliefs about desired organizational outcomes. These beliefs are fundamental elements of any organization belief system (Walsh and Fahey 1986). This article will use the competing values framework (Quinn and Rohrbaugh 1983) to parsimoniously capture a range of beliefs regarding desired organizational outcomes.

Another characteristic of SSTs is that they are designed to be used by customers, which brings into play beliefs about customers. These beliefs are considered essential components of an SST belief model because (i) the definition or representation of ‘service’ necessarily involves a customer (Glushko and Nomorosa 2012), and (ii) when designers² devise a technology, they try to explain or predict how its users will behave, which involves having a mental model of the user (Glushko and Nomorosa 2012). This article will focus on beliefs about customers’ autonomy, ability, motivation, and personalization.

The third characteristic of SSTs is that they change the geography of organizational knowledge by transposing the employee knowledge required to produce a service into a computer interface and/or by requiring the customer to acquire the knowledge. This characteristic brings into play epistemological beliefs about service delivery knowledge, such as its source and structure. Epistemological beliefs are also considered to be essential components of managers’ SST belief models because “epistemologies are developed and applied in *all* forms of social practice that produce and communicate knowledge” (Ekstrom 2002, p. 260, italics ours).

It should be noted here that these beliefs can be individually held or shared among organizational members. If held individually by members, these beliefs may influence decision-makers’ preferred level of SST co-production³; if shared widely within the firm, they may influence the level of SST co-production preferred by the firm. As one reviewer commented, it can be a big leap between individual managerial beliefs and organizational decisions about SST co-production level. We agree, though there are factors that

may moderate the size of the leap. One factor may be the degree of belief synchronicity among organizational members: at one extreme, beliefs are idiosyncratic, and at the other, beliefs are deeply internalized and unquestioned by members (Gray et al. 1985). Belief synchronicity at this latter extreme is similar to Prahalad and Bettis’s (1986) notion of dominant operating logic, and would yoke individual beliefs to organizational decisions. Another factor may be whether SST decision-making is centralized and among whom (Dutton and Jackson 1987). “It is not just beliefs but *whose* beliefs which dominate that is most important” (Walsh and Fahey 1986, p. 327, italics ours), and how much power they have to impose their beliefs on others (Lyles and Schwenk 1992). The beliefs of the top management team in particular have significant influence on the way the firm is managed (Prahalad and Bettis 1986), affecting policies and procedures that shape organizational culture (Schneider and Shrivastava 1988). The SST belief models of top managers are thus likely to influence the organization’s chosen level of SST co-production.

The structure of the managerial SST belief model

An organizational configuration is a constellation of conceptually distinct characteristics – such as beliefs, ideologies, technologies, strategies, and practices – that commonly occur together (Meyer et al. 1993). Configurational theory posits that organizational characteristics tend to fall into coherent patterns (Meyer et al. 1993) and that any given organizational phenomenon manifests itself in a finite number of configurations (Miller and Friesen 1984). This theory proposes that variety is limited in practice because the constituent dimensions (beliefs, in our case) are interdependent, and dimensions change only discretely or intermittently (Meyer et al. 1993). Configurations of beliefs, technologies, strategies, and practices have been observed in scores of organizational phenomena, such as the organization of marketing activities (Vorhies and Morgan 2003), marketing–sales interface (Homburg et al. 2008), municipal government structure (Greenwood and Hinings 1993), and key account management (Homburg et al. 2002).

The configurational view of the SST belief model implies that SST co-production can be categorized into a small number of distinct levels.⁴ This idea has support in three streams of literature. The first deals with customer integration in supply chain activities, which is a type of co-production. This

² Like Bostrom and Heinen (1977), the term “designers” in this section refers to all people who can influence technology design decisions, which includes managers.

³ This paper focuses on managers’ *preferred* level of SST co-production, as practical circumstances, such as the presence of legacy systems, may prevent managers from adopting SSTs, as one reviewer noted.

⁴ It is left for future research to specify what the distinct levels of SST co-production (and corresponding SST hardware/software functionality) are for each industry. The industry-dependency of SST co-production levels is predicted by the archetypal theory of organization design (Greenwood and Hinings 1988), which posits that organizations are embedded in an environmental setting that legitimates a restricted number of design and belief configurations.

literature divides integration activities into two types with distinctly different purposes – coordinative or collaborative – having different antecedents and consequences (Ahmed and Pagell 2012; van der Vaart et al. 2012).

The second is the SST literature that suggests that SSTs can be grouped by the type of goal customers can achieve through an SST. For example, Bitner et al. (2002) noted that SSTs of circa 2002 generally allowed customers to achieve three types of goals: (i) customer service - answering commonly asked questions such as account balances and delivery tracking; (ii) direct transactions - allowing customers to order, buy, and exchange resources with firms without interacting with employees, and (iii) education - enabling customers to learn and to train themselves. Kiosks generally allow customers to achieve four types of goals: (i) information about products and services; (ii) information exchange via a two-way dialog between firm and customer; (iii) transaction, and (iv) relationship and communication (Rowley and Slack 2003). Even supermarket scanners have a few functionality levels, allowing customers to check prices in-store and to check items out of the store.

Third, the information technology literature observes that the degree of utilization of a technology within an organization occurs in distinct stages, with different purposes and functionalities at each stage. One reason why distinct levels of technology utilization are thought to occur is that, as organizational members gain experience with a technology at a basic level, they see possibilities of use at higher levels (Zmud and Apple 1992). This pattern of distinct levels of utilization has been found with dozens of information technologies, such as e-business (Srinivasan et al. 2002), material requirements planning (Cooper and Zmud 1990), and electronic medical records systems (Dey et al. 2013). This change in utilization level is reflected in accounts of SST implementation that describe a firm's initial implementation driver being cost reduction, but changing to increasing customer satisfaction as the project progressed (e.g., Doyle 2007; Salomann et al. 2007).

This remainder of this section describes the relationship between each belief and level of SST co-production. Figure 1 shows the SST belief model.

Beliefs about desired organizational outcomes and SST co-production level

The competing values model of organizational effectiveness (Quinn and Rohrbaugh 1983) is adopted here to understand the relationship between beliefs about desired organizational outcomes and the level of SST-enabled co-production. This model was developed on the recognition that different people have different beliefs about organizational effectiveness (Campbell 1977), and thus desired organizational outcomes (Quinn and Rohrbaugh 1983).

The competing values model posits that effectiveness values vary along two dimensions, shown in Fig. 2. One dimension reflects an internal focus (development and improvement of internal processes, systems, and people) versus an external focus (development of the firm vis-à-vis its external environment and external entities). The observation that firms may introduce SSTs to reduce costs or to increase customer satisfaction (Bitner et al. 2002; Huang and Rust 2013) seems consonant with internal and external foci, respectively. The second dimension reflects the desired amount of organizational control (predictability, stability, and coordination) versus flexibility (innovation and adaptation). The observation that firms can introduce SSTs to increase efficiency or to adapt delivery to reach new customer segments (Bitner et al. 2002; Huang and Rust 2013) seems consonant with control and flexibility concerns, respectively.

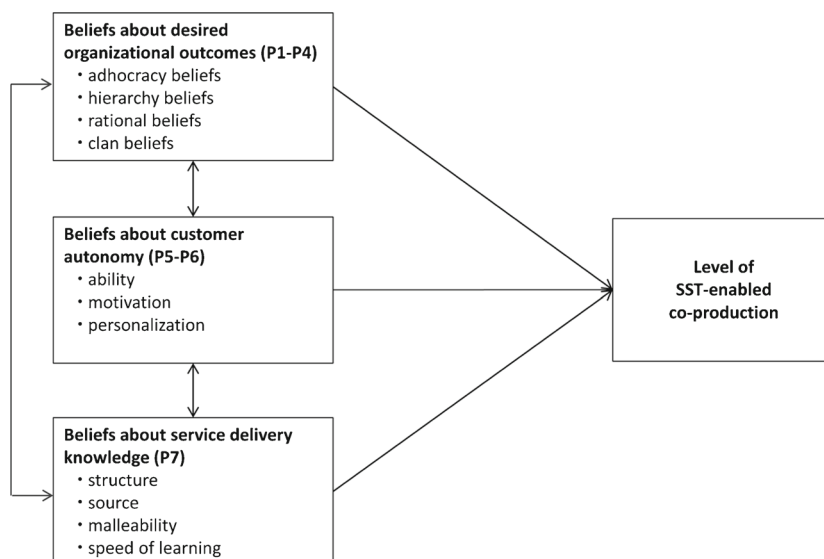
These dimensions cross to form a four-cell model of effectiveness, with each cell differing with respect to beliefs regarding desired organizational outcomes and means for achieving those outcomes. These beliefs can operate at the level of the individual to influence individual behaviors (e.g., Lawrence et al. 2009) or they can be shared among members within a firm to influence firm decisions (e.g., Buenger et al. 1996). (Hereafter, when this section refers to subscribers to particular values, it is alluding to either individuals or firms having those values). Competing values have been found to influence the design of scores of technologies, such as marketing information processes (Moorman 1995), product-market strategy (Yarborough et al. 2011), product design (Lukas et al. 2013), advanced manufacturing technologies (Zammuto and O'Connor 1992), organizational coordination structures (Buenger et al. 1996), research program structures (König et al. 2013), supply chain integration practices (Braunscheidel et al. 2010), total quality management practices (Zu et al. 2010), software improvement practices (Shih and Huang 2010), systems development practices (Iivari and Huisman 2007), and management information system functionality (Cooper and Quinn 1993).

This section will now propose how competing values influence the preferred level of SST-enabled co-production.

Adhocracy and hierarchy beliefs and SST co-production level

The adhocracy value system is external- and flexibility-focused. In this value system, as described by Cameron and Quinn (2006), the purpose of the firm is to develop new products and services that create new standards of performance. The firm should not only give customers what they would like, but also anticipate customer needs, surprising and delighting them with products and services that solve problems that customers might not have identified otherwise. Anticipation of the future and quick adaptation to new opportunities is believed to lead to acquisition of new resources,

Fig. 1 The SST belief model, showing beliefs that shape managers’ preferred level of SST-enabled co-production



Notes: SST denotes self-service technology. The bi-directional arrows between beliefs denote that beliefs are inter-related and form configurations, with different belief configurations cohering with different levels of SST-enabled co-production.

profitability, and rapid growth in new markets. New ideas, experimentation, and innovation should be valued, as these lead to the creation of new markets, new customers, and new opportunities.

The hierarchy value system is internal- and control-focused – the opposite of an adhocracy. In this value system, as described by Cameron and Quinn (2006), the purpose of the firm is to produce efficient, reliable, smooth-flowing and predictable output; and rules, specialization, impersonality and accountability are valued. The firm should have clear lines of decision-making authority, standardized procedures, and control mechanisms. Its criteria of effectiveness should be efficiency, timeliness, smooth functioning, low cost, and predictability, which are achieved through improved measurement and control of organizational processes.

Several pieces of evidence suggest that the adhocracy and hierarchy value systems lead to a preference for the highest

and lowest levels of SST-enabled co-production, respectively. First, customer competency is a resource that can help firms provide effective service delivery (Lengnick-Hall 1996). Subscribers to adhocracy values are likely to recognize these resources, as they value successful interaction with the environment to acquire valuable resources for effective operations (Walton and Dawson 2001). Moreover, research has found that adhocracy (/hierarchy) values are positively (/negatively) associated with external integration of customers, involving information-sharing with key customers and joint development of new products (Braunscheidel et al. 2010) – a form of co-production. Also, a high degree of co-production (wherein customers contribute to service processes and co-design offerings) has been found to be associated with an innovation orientation and capability (Chen et al. 2011; Ngo and O’Cass 2013), which is a characteristic of the adhocracy value system. Therefore, subscribers to adhocracy values may be more willing to involve customers in co-production via an SST than are subscribers to hierarchy values.

Second, customer involvement raises the level of uncertainty in production activities (Argote 1982). A firm that uses SSTs must design the SST to accommodate customer diversity, such as varying eyesight, dexterity, and cognitive resources (Hilton et al. 2013). Subscribers to adhocracy values are more likely to handle this uncertainty and diversity better than subscribers to hierarchy values, since the former prize flexibility and adaptability while the latter prize predictability and standardized operations.

Third, subscribers to adhocracy beliefs value the use of leading-edge technologies and a willingness to experiment (Howard 1998), unlike subscribers to hierarchy values.

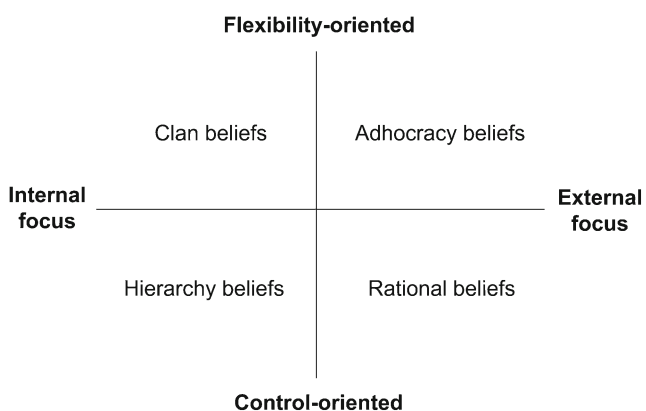


Fig. 2 The Competing Values framework (Quinn and Rohrbaugh 1983)

Research has found that firms with adhocracy (/hierarchy) values incorporated too much (/too little) functionality in their technology products, as judged by customers (Lukas et al. 2013); this finding may extend to the level of SST functionality these firms would offer to customers. Also, adhocracy (/hierarchy) values have been found to positively (/negatively) predict technological opportunism (i.e., a firm's ability to sense, understand, and respond to new technologies), which in turn predicts the level of e-business functionality used (ranging from a simple tool to communicate with customers, to transaction-based support, to full electronic ordering and payment) (Srinivasan et al. 2002). Relatedly, a circa-1997 study found that firms that adopted websites had more aggressive technology policies (as assessed by product development investment, and awareness and use of latest technology) and saw more advantages in website adoption (e.g., access to worldwide information, creation of worldwide e-presence, new business opportunities) than non-adopters of websites (Teo et al. 1997/1998). The characteristics of these adopters seem consonant with adhocracy values. In sum, this third piece of evidence suggests that adhocracy subscribers' tendency to utilize leading-edge technology will render them more willing to offer a higher level of SST-enabled co-production, whereas subscribers to hierarchy values would offer the lowest level.

The ideas outlined above can be formalized as follows:

- P1:** The stronger the adhocracy beliefs among decision-makers, the stronger the preference for high levels of SST-enabled co-production.
- P2:** The stronger the hierarchy beliefs among decision-makers, the stronger the preference for low levels of SST-enabled co-production.

Clan beliefs and SST co-production level

A clan value set is internal- and flexibility- focused. In this belief system, as described by Cameron and Quinn (2006), the firm's purpose is the creation of a humane work environment. The firm should provide a friendly place to work and be like an extended family held together by loyalty and tradition, with members sharing a lot of themselves. The firm should emphasize the long-term benefit of human resource development and should attach great importance to teamwork and employee participation, cohesion, and morale. Success should be defined in terms of concern for people, and criteria for effectiveness should include cohesion, employee morale, employee satisfaction, human resource development, and teamwork. A fundamental assumption in this belief system is that effectiveness arises from employee satisfaction.

The evidence is mixed regarding the level of SST co-production favored by subscribers to clan values. On one

hand, there is evidence to suggest that clan subscribers are likely to offer a high level of co-production. As mentioned above, customer involvement raises the level of uncertainty in production activities (Argote 1982) and a firm that uses SSTs must design the SST to accommodate customer diversity (Hilton et al. 2013); because of their flexibility orientation, clan subscribers are likely to be able to adapt to this uncertainty and diversity. Furthermore, firms with clan values have been found to exhibit little resistance to change (Zammuto and Krakower 1991), and are more conducive than other value systems to the implementation of total quality management (TQM) (Prajogo and McDermott 2005), which is a tool for better meeting customer needs; these findings may extend to these firms' implementation of SSTs, which are also tools to better meet customer needs.

On the other hand, two pieces of evidence suggest that clan subscribers would tend to offer a low level of SST co-production. First, these subscribers are not focused on acquiring resources from the external environment (which is a characteristic of adhocracy values); so they are not likely to recognize customer competency as a resource to improve service delivery. This is supported by research that found clan values to be unrelated to degree of customer integration (Braunscheidel et al. 2010) – a form of co-production. This evidence suggests a low tendency to utilize customer competency resources via co-production.

Secondly, clan subscribers do not value the use of leading-edge technologies per se (which is a characteristic of adhocracy values). Research has found that clan scores did not predict technological opportunism (Srinivasan et al. 2002), but rather predict the incorporation of *too little* functionality in their technology products (Lukas et al. 2013); these findings may extend to the level of SST functionality these firms would offer customers. This evidence thus suggests a low tendency among clan subscribers to implement leading-edge use of SSTs.

These conflicting pieces of evidence can be reconciled, however, by considering that subscribers to clan values may evaluate a technology in terms of employee benefit. Prajogo and McDermott (2005) surmised that their finding of clan values being more conducive to TQM implementation was due to TQM's emphasis on teamwork and employee empowerment. The importance of employees benefitting from a technology is even more salient in a study (Stock and McDermott 2000) that found that, among firms that implemented advanced manufacturing technologies, those with clan values reported *no* competitive or operational benefits, but still judged their implementation to be a success! This study's authors also surmised that this surprising finding was due to the benefits that advanced manufacturing technologies bring to employees.

Hence, it is proposed here that subscribers to clan values will offer the level of SST co-production that brings the

greatest benefit to employees. Self-service removes simple, routine tasks from customer interaction, leaving the remaining interaction devoted to more demanding service (Selnes and Hansen 2001) (e.g., Home Depot shifted employees to more value-added tasks after introducing self checkouts (Anand 2011)). If employees view routine service as monotonous and boring, and prefer to deal with more demanding customer queries, then it is expected that the SST will incorporate routine customer services.

These ideas can be formalized as:

P3: The stronger the clan beliefs among decision-makers, the stronger the preference for a level of SST-enabled co-production that brings most benefit to employees.

Rational beliefs and SST co-production level

A rational value system is external- and control-oriented. This value system, as described by Cameron and Quinn (2006), frames the firm's purpose as creating competitive advantage by conducting transactions (e.g., sales, contracts) with external constituents (e.g., suppliers, customers) based on monetary exchange. Profitability, bottom-line results, premium levels of financial return, strength in market niches, stretch targets, and secure customer bases should be the firm's primary objectives. Basic tenets in this value system are that the external environment is hostile, that customers are choosy and interested in value, and that the firm should optimize its competitive position. This value set emphasizes winning, and believes in adopting an aggressive strategy to exceed the performance of competitors. Reputation, competitive pricing, market penetration, and market leadership are important. Customer service should be managed well, and customer expectations exceeded. An underlying belief is that competitiveness creates productivity.

The evidence is mixed regarding the level of SST co-production favored by subscribers to rational values. On one hand, there is evidence for rational subscribers being likely to offer low levels of SST co-production. First, these subscribers are not focused on acquiring resources from the external environment (which is a characteristic of adhocracy values), so they would be expected to have a low tendency to utilize customer competency resources through co-production. Second, these subscribers are not committed to innovation for the sake of being leading-edge (also a characteristic of adhocracy values), which accords with an empirical finding that rational values do not predict technological opportunism (Srinivasan et al. 2002).

On the other hand, there is evidence to suggest that rational subscribers would tend to offer high levels of SST co-production. Braunscheidel et al. (2010) found a slightly significant relationship between rational values and customer integration. Also, Lukas et al. (2013) found that firms with rational values

incorporate *too much* functionality in their technology products; this finding may extend to the level of SST functionality these firms' would offer customers.

These conflicting pieces of evidence can be reconciled, however, by considering that subscribers to rational values may evaluate a technology in terms of competitive benefits. Braunscheidel et al. (2010) surmised that their finding could be due to the presence of two competing forces operating within the rational firm, with one force inhibiting customer integration because it involves a loss of control, and another force promoting customer integration because it enhances competitiveness. Lukas et al. (2013) also explained their finding by alluding to the rational firm's need to catch up and outperform competitor offerings.

It thus seems reasonable to expect that rational subscribers will aim to offer the same or higher levels of SST co-production as their competitors, simply to outperform them. Therefore:

P4: The stronger the rational beliefs among decision-makers, the stronger the preference for levels of SST co-production that meet or exceed the SST co-production level offered by competitors.

Beliefs about customers and SST co-production level

Many scholars have observed that designers of technology hold mental models of the technology's users. For example, marketers (Zwick and Dholakia 2004), advertising professionals (Hackley 2003; Kover 1995), alcohol therapists (Moyers and Miller 1993), information system analysts (Dagwell and Weber 1983; Hedberg and Mumford 1975), information system developers (Iivari et al. 1998), human factor engineers (Perrow 1983), management information systems (MIS) designers (Ackoff 1967), journal article reviewers (Ragins 2015), managers (McGregor 1960), web banner designers (Fourquet-Courbet et al. 2007), television journalists (Ekstrom 2002), piano players (Oura and Hatano 2001), civil designers (Winner 1985), frontline employees (Di Mascio 2010), management professors (Greenberg et al. 2007), and teachers (Mayer 1996) have mental models of customers, clients, listeners, authors, users, or students.

It is likely that mental models of users can become embedded in a technology's design by influencing the technology's functions or features. "... [I]n designing artifacts we do not merely design the artifacts themselves: deliberately or not, we also design conditions for their human use" (Ehn 1988, p. 1). For example, designers of public facilities (e.g., bridges, buildings, and buses) who imagine only able-bodied users tend to build them with features only able-bodied people can use (Winner 1985). MIS designers who view employees as able to participate in decision-making incorporate user-controllable functions in their MIS (Cooper and Quinn

1993). Advertising copywriters who perceive viewers as “drawn, humiliated by the defeats of the day, paralyzed with fatigue” (Kover 1995, p. 599) design a ‘hook’ into their copy whose function is to break through to viewers.

There is evidence to suggest that the perceived degree of user autonomy influences the functionality designed into a technology. In the workplace, for instance, perceptions of worker autonomy influence the design of organizational structures: managers who believe workers are responsible and prefer to take control of their environment design flexible organizations with self-direction allowed at all levels, while managers who believe workers prefer order and tightly specified boundaries design highly structured hierarchical organizations with precise job definitions (McGregor 1960). In the classroom, teachers who view learners as autonomous help them diagnose learning needs and determine learning content collaboratively with learners, while teachers who view learners as dependent and passive, direct learning and make all curriculum decisions (Balfour and Marini 1991). In the psychology laboratory, humanistic psychologists, who see human beings as having choice and being able to be an “architect of himself” (Rogers 1974, p. 118), choose different research methods from behaviorist psychologists, who see human beings as ‘repertoires of behaviors’ that are determined by environmental contingencies (Rogers 1974). In the information systems field, designers vary in the degree of autonomy attributed to the user, which means that they choose different tools, techniques, and activities to develop information systems (Iivari et al. 1998).

Given these findings, it is reasonable to expect that managers who imagine the customer as autonomous would tend to prefer a high level of SST co-production to support customer autonomy. Thus:

P5: The more that customers are viewed as autonomous by decision-makers, the stronger the preference for high levels of SST co-production.

Contributors to beliefs about customer autonomy

There is reason to suspect that technology designers’ mental models of users differ according to three characteristics, with each characteristic contributing to the perception of user autonomy. One characteristic is the degree to which users are personalized. Personalization imputes agency, or autonomy, to individuals (LaMothe 2007), and occurs when one is more likely to perceive others as individuals with a range of distinct characteristics or ways of behavior, and is less likely to see them as representatives of a social group (Postmes et al. 2002), such as a market segment. The degree of personalization may depend on how psychologically close the designer perceives the user to be, as construal level theory (Trope et al. 2007) posits that people use increasingly abstract representations of

an object (in this case, a technology user) as psychological distance increases, with the abstract representation retaining central features and omitting features deemed incidental.

Studies in various fields support this idea that designers vary in the degree to which they personalize users, such that designers at one extreme may be only distantly aware of anonymous users, while designers at the other extreme may appreciate each user as a unique human being. In the information systems field, for example, Isomaki (2007) identifies three types of user models held by designers: one where designers view users as part of a featureless mass; one where designers view users in terms of their responses to the external environment, technology, and work tasks; and one where designers view users as human beings just like themselves, having mental, social, and cultural modes of being. In the organizational design field, Driver (1983) observes different types of employee models: designers subscribing to contingency theory overlook employees completely in their designs; sociotechnical designers discern employees but see them as being the same, overlooking individual differences; and a third type of designer view employees as individuals, each with their own knowledge, motives, emotional patterns, and leadership styles. In the ergonomics field, Morales and García-Acosta (2012) observe that different schools of vergonomists attribute varying degrees of humanity to users. Some schools see users as “... nothing more than one more element in the system” (p. 3104); other schools see users in terms of their response measures, such as biomechanical and anthropometric measures; and other schools see the user as a human being with diversity, life experiences, and motivations. In the service field, Chase and Hayes (1991) note a progression in the degree to which service designers individuate customers, ranging from customers being unspecified (i.e., overlooked), to falling into market segments with common needs, to being individuals; Di Mascio (2010) observes a similar progression in frontline employees’ views of customers.

The other two characteristics that may contribute to perception of user autonomy concern the degree to which users are viewed as motivated and able to use the technology. When designers design a technology intended for use, they try to explain or predict how users behave while using the technology (e.g., Glushko and Nomorosa 2012). A layperson trying to explain or predict the actions of others uses folk – or commonsense – psychology, relating the action to the actor’s motivation and ability (Heider 1958; Malle and Knobe 1997). Scholars in the information systems field have observed that information system designers’ models of users contain ascriptions of user motivation (e.g., initiative) and ability (e.g., capability of handling a range of tasks) (Dagwell and Weber 1983; Grupe 1994; Hedberg and Mumford 1975). Zuboff (1985) writes that the design of work automation systems reflects managers’ assumptions about the motivation and commitment of employees using these systems, and whether employees are ‘smart’ (i.e., able). Writing about kiosks, Slack

and Rowley (2002) note that, in contrast to early kiosks, “[new kiosks] assume a computer literate user who understands a web page format, and is prepared to navigate a larger and more complex infobase” (p. 69); this statement alludes to an ability facet (i.e., literacy) and a motivation facet (i.e., users are “prepared to navigate”). Like personalization, an actor’s motivation and ability impute the actor with intentional behavior (i.e., behavior that occurs when actors plan and execute actions to satisfy a need), which characterizes agency or autonomy (Malle and Knobe 1997). Hence,

P6: Customers are viewed as more autonomous the more they are (a) personalized, and the more they are seen as (b) motivated to use the SST, and (c) able to use the SST.

Beliefs about service delivery knowledge and SST co-production level

Knowledge is an abstract concept, not a fixed objective entity, so individuals can vary in their beliefs about knowledge (Perry 1968; Schommer 1990). These personal beliefs about knowledge, or epistemological beliefs, relate to such aspects of knowledge as its structure (e.g., whether knowledge comprises simple isolated facts or is integrated and complex), its source (e.g., whether available from an authority or derived through reason), the speed of its acquisition (e.g., whether acquired quickly or slowly), and the malleability of learners (e.g., whether learner ability is fixed or changeable) (Schommer 1990). Personal epistemological beliefs influence what people do to acquire knowledge, such as strategies used to study (Schommer-Aikins and Easter 2008) and understand text (Kardash and Howell 2000) and the degree of persistence in learning difficult tasks (Dweck and Leggett 1988).

Epistemological beliefs can influence other practices involving the creation or application of knowledge (Ekstrom 2002). For example, in the knowledge management field, if a firm believes that knowledge is fixed and representable (i.e., comprising unchanging isolated facts), it designs its intranet to facilitate acquisition, storage, and presentation of knowledge; if a firm believes that knowledge resides in connections between experts (i.e., a source belief), it designs its intranet to facilitate the making of connections between different departments (Skok and Kalmanovitch 2005). In the classroom, instructors choose teaching strategies that reflect beliefs about the best methods to speed up learning (Leidner and Jarvenpaa 1995). In research, epistemological positions, such as positivism and antipositivism, influence the methods researchers use to generate knowledge (Iivari et al. 1998; Tronvoll et al. 2011). In the workplace, managers who facilitate subordinates’ learning by encouraging them to explore solutions to problems are posited to have beliefs that knowledge can be acquired gradually (speed and malleability beliefs) and can be constructed by the learner (a source belief), while managers

who do not encourage subordinates to develop their own solutions are posited to have the opposite beliefs (Tickle et al. 2005).

Because SSTs enable customers to produce a service without employee involvement (Meuter et al. 2000) by embedding the required knowledge within the SST and/or expecting the customer to develop the required knowledge (Hilton and Hughes 2013), the task of designing an SST also involves the creation and application of knowledge, and thus could be influenced by epistemological beliefs. This idea is not entirely new; indeed the SST literature is sprinkled with indirect references to epistemological beliefs. For example, Hilton and Hughes (2013) write, “... organizations will need to articulate exactly what knowledge ... customers require (*reflecting a structure belief of knowledge as simple isolated facts*); how they will acquire [it] (*reflecting a belief that customer ability is malleable*), from where, or from whom (*reflecting a source belief*); and what the associated learning curve will involve (*reflecting a speed belief*)” (p. 872, italicized content added). Salomann et al. (2007) write that one organization that implemented an SST had conducted workshops and interviews with employees to “explicate their business knowledge, which [was] then implemented in [the SST]” (p. 314), which reflects a structure belief of knowledge as a set of isolated facts (which makes extraction straightforward), and a source belief of knowledge as residing within employees and the SST.

If, in each of these statements regarding SSTs, the belief were opposite to that expressed, then the SST design would likely be different. For example, if instead Salomann et al.’s (2007) designers viewed knowledge as being an integrated complex and only sourced within employees, then extraction would not be straightforward, and the SST would likely not be constructed. Based on the above discussion, the following is proposed:

P7: Beliefs that the knowledge required in service delivery is structured as simple isolated facts that can be sourced outside employees, and that customers have malleable ability and can learn quickly, lead to a preference for higher levels of SST co-production than opposite beliefs (i.e., that service delivery knowledge has an integrated, complex structure and is sourced only within employees, and that customers have fixed ability and cannot learn).

A case illustrating the SST belief model

This section will demonstrate the face validity of the proposed framework and propositions, using a case study (Di Mascio 2005) that documented the results of open-ended interviews with 28 call center managers on how the Internet, a particular type of SST, could be used to serve customers. These

managers may or may not have been involved in deciding website functionality at the time; nevertheless, their views illuminate their preferred level of website functionality. Di Mascio found that these managers could be classified into four groups, based on the purpose for which they imagined a website could be used. One group focused on the website acting as an electronic brochure, containing general company information and highlighting the call center phone number for customers to ring; customers would not be able to conduct transactions online. Another group of managers saw the website as also providing customers email access to the call center, in addition to acting as an electronic brochure; customers would still rely on the call center for detailed information or to place orders. The third group of managers saw the website as not only allowing customers email access, but also acting as a database of commonly requested information that customers could retrieve themselves, thus relieving staff of routine inquiries. The fourth group saw the website as an alternate way to meet customer needs in lieu of the call center; the call center and website would cater to the needs of customers who desired, or did not desire, human interaction, respectively. Because these four purposes vary in the level of co-production offered to customers, this case illustrates how Internet-based SST co-production can be classified into distinct levels.

Text excerpts from Di Mascio's findings can be categorized according to beliefs they manifest in the SST belief model, to elucidate configurations of beliefs that cohere with the four different levels of Internet-enabled co-production. Table 1 presents the text excerpts in the case and shows how they came to be categorized in that way.

The managers in the 'website as virtual brochure' group seem to advocate zero self-service. They seem to display internal – and control – values (i.e., hierarchy), illustrating P2. They also seem to assign no personalization or autonomy to the customer, illustrating P5 and P6 partially; and they seem to view service delivery knowledge as being located within employees, partially illustrating P7.

The managers in the 'Website fulfills customer needs in lieu of call center' group advocate a high level of self-service or co-production. These managers appear to assign ability, motivation, personalization, and autonomy to the customer, thus illustrating P5 and P6. They seem to view service delivery knowledge as capable of being located outside employees, at least some knowledge as being simple, and customers as having malleable ability and able to learn quickly, illustrating P7. These managers' views suggest external- and flexibility- beliefs (i.e., adhocracy competing values), thus illustrating P1. However, they seem to balance external values with internal values, and flexibility values with control values, so these managers also display hierarchy values, which does not concord with P2. This discordance suggests that the presence of adhocracy values may override the effect of hierarchy

values in this SST co-production decision (though this is a point for future research to clarify).

The two remaining groups of call center managers ('Website as providing email access to call center' and 'Website providing answers to routine requests') displayed belief patterns that seem to fall between the two patterns described above. The analysis suggests that flexibility beliefs could be more conducive to higher levels of self-service than control beliefs, possibly because subscribers to flexibility beliefs can handle uncertainty and diversity better than subscribers to control beliefs. These groups also illustrate P5 and partially P6, as they view customers as having low personalization (but not zero personalization) and some autonomy.

Table 1 also shows that beliefs varied in the extent to which they are represented in the call center manager accounts, which could suggest that some beliefs (e.g., competing values) could play a more salient role than others (e.g., speed of knowledge acquisition) in determining the level of SST-enabled co-production (though this is for future research to test).

Discussion

This article employs a managerial cognition perspective to show how beliefs about desired organizational outcome, customers, and knowledge influenced managers' preferred level of SST co-production. It departs from an assumption of rational managerial decision-making (i.e., that managers all possess the same knowledge, all reason the same logical way, all notice the same stimuli, and all pursue the same goals (Stubbart 1989)) about co-production. It also counterbalances the SST literature's predominant focus on relating *customers'* beliefs and SST adoption decisions (e.g., Meuter et al. 2005; Wang et al. 2013). Elucidation of managerial SST belief models contributes to several streams of literature.

A configurational view of SST-based service

The SST belief model proposes that SST-enabled co-production levels and beliefs about desired organizational outcomes, customers, and knowledge are structured as configurations. A configurational approach to understanding organizational phenomena is common in the management, innovation, and information systems literatures (Masini and Van Wassenhove 2009; Short et al. 2008); is starting to be applied in the service literature (e.g., service strategy and structure configurations (Gebauer et al. 2010) and customer adoption of service innovations (Ordanini et al. 2014)); and is applied in this article to preferred levels of SST co-production. A configurational view means that the belief model in Fig. 1 is not a variance model in which the antecedent beliefs have independent effects on co-

Table 1 Analysis of Di Mascio (2005) findings, showing belief configurations underlying different levels of Internet-enabled co-production

Model belief		Is model belief exhibited in call center manager accounts? Reasoning			
		Managers who see website as a virtual brochure (3 managers)	Managers who see website as providing email access to call center (13 managers)	Managers who see website as providing answers to routine requests (7 managers)	Managers who see website fulfilling customer needs in lieu of call center (5 managers)
Beliefs about desired organizational outcome					
Internal	Yes		Yes	Yes	Yes
	- these managers saw their role as ensuring smooth running of the call center and protecting the role of the call center (p. 6), and that the purpose of the electronic brochure was to benefit the company not customers: “to give more exposure and more brand awareness to the company” (p. 6)		- these managers focused on ensuring key performance indicators were met (p. 7)	- these managers saw their role as ensuring the call center runs smoothly and supporting staff (p. 7), they saw the purpose of using the Internet in this way was “to ease the burden on call centre staff by reducing the number of routine enquiry calls” (p. 7) - “One of the things that annoys reps is the frequently asked questions, the same dumb questions..” (p. 17)	- these managers saw their role as balancing the needs of customers with the needs of the business (p. 8). The focus on business needs suggests an internal consideration.
External			Yes		Yes
			- managers felt positive about the web providing customers with an additional method of communication (p. 7).		- “I think in my job I have to put myself in the shoes of the customer because otherwise I’m not doing my job” (p. 17)
Control	Yes		Yes	Yes	Yes
	- these managers tried to balance workload and efficiency, and meet key performance indicators (p. 6).		- these managers saw their role as ensuring key performance indicators were met (p. 7) - “an email is like a phone call. Treat it the same way, same respect... you will never have a problem...” (p. 17)	- these managers saw their role as ensuring call center runs smoothly (p. 7) - “...I should be aiming to reduce the calls through better harnessing of our information unit...” (p. 17).	- “The Web will enable us to run our business more efficiently on line” (p. 17)
Flexibility				Yes	Yes
				- these managers try to learn about other ways that the Internet could help staff e.g., how the website could be re-designed to reduce the number of incoming calls. Learning suggests that they try to adapt to new information.	-these managers saw their role as learning about changes in customer needs and to find ways to meet those needs (p. 8), and seem open to ideas from any source such as clients and shareholders...and staff” (p. 17).
Beliefs about customers					
Ability		Some		Some	Yes
		- even though these managers viewed customers as being unable to search the Internet for information, they acknowledged that customers could send emails, though “[I]t’s a lot easier to pick up a phone...and getting an instant answer.” (p. 18).		- these managers saw customers as capable of accessing common information on the web but not having research skills for complex queries (p. 18)	- these managers saw customers as having the ability to do everything themselves (p. 18)
Motivation		No		Yes	Yes
		- these managers viewed customers as being unwilling to search the Internet for information, as it’s a lot easier to pick up a phone (p. 18).		-“the requests that we’re getting are from someone that has gone to the Web site with a purpose” (p. 18). A ‘purpose’ suggests motivated action.	- these managers saw customers as <i>desiring</i> to interact directly with organizational systems not humans (p. 8). ‘Desire’ suggests motivation.

Table 1 (continued)

Model belief		Is model belief exhibited in call center manager accounts? Reasoning			
		Managers who see website as a virtual brochure (3 managers)	Managers who see website as providing email access to call center (13 managers)	Managers who see website as providing answers to routine requests (7 managers)	Managers who see website fulfilling customer needs in lieu of call center (5 managers)
Personalized	No - these managers viewed all customers as the same (p. 8). - One manager likened giving customers access to the firm via the web to opening the gates to the <i>masses</i> (p. 6)	Low - these managers treated all customers as the same (p. 8)	Low - these managers treated all customers as the same (p. 8)	Yes - these managers recognized differences in customer preferences, and that some customers preferred a personal touch (p. 8)	
Autonomy	No - these managers seem to see customer behavior as being determined by the organization: "...the company had invested heavily in call centre technology, so customers should be encouraged to use it" (p. 6) and "[T]he emphasis on smooth operation necessitated customers not be given access to the organisation via the Internet, since access could not be managed" (p. 6)	Some - these managers saw customers as preferring to speak with an agent, and the call center role was to answer their queries. The word 'preferring' suggests some autonomy.	Some -these managers saw it as a positive thing that customers could retrieve all the information they needed independently: "some people get all their information from the net and go through enrolment on the net and never call us" (p. 18), and " I think it would be absolutely fantastic if customers could bring up online their own account... " (p. 17). These managers saw the role of the call center as " ...partly reactive and partly shaping in the sense that agents would try to shape customers' future behavior by encouraging them to use the Web site ... " (p. 7)	Yes - these managers viewed customers as "... autonomous agents who could choose to go elsewhere if they were not satisfied" (p. 8), and saw the website as providing everything that customers would need, including the ability to interact with a human if desired (p. 8)	
Beliefs about knowledge					
Structure		Complex integrated - "...because of the complexity of products and...that you have to be so specific with the information given out that you can't really give blanket statements about anything ... " (p. 18)	Combination of simple and complex - these managers saw that knowledge about products and ordering procedures could be programmed into the website, but specialized knowledge could not be programmed onto the website (p. 7)	Simple - these managers saw knowledge about product information and ordering procedures could be programmed onto the web (p. 8) suggests that they saw this knowledge as simple.	
Source	Within employees - knowledge about products and order-taking procedures was held by customer service agents, and could not be programmed satisfactorily into a website (p. 6).	Within employees - "[P]roduct and order fulfillment knowledge resides within the agent (p. 18)	On website and employees - these managers saw that the website could act as a database of information about products and ordering procedures, but that agents would retain the specialized information that could not be programmed onto the web (p. 7).	Within customers, employees, website -the quote that "Customers would interact directly with organizational systems ... " (p. 8) or could interact with a human if desired (p. 8) suggests that required information could be within customers, website, agents.	
Malleability			Some - these managers saw that customers could be encouraged to use the web for common queries, but could not be trained to answer	Yes - one manager states "It will become the norm very quickly where people can do everything via the Internet"	

Table 1 (continued)

Model belief	Is model belief exhibited in call center manager accounts? Reasoning			
	Managers who see website as a virtual brochure (3 managers)	Managers who see website as providing email access to call center (13 managers)	Managers who see website as providing answers to routine requests (7 managers)	Managers who see website fulfilling customer needs in lieu of call center (5 managers)
			complex queries themselves by providing search tips on the web (p. 7)	(p. 18), which indirectly refers to a malleability belief
Speed				Fast - one manager states “It will become the norm very quickly where people can do everything via the Internet” (p. 18), which indirectly refers to a speed belief

Blank cells indicate the text contains insufficient evidence to form any clear conclusion about the presence of absence of this belief

production level, and where a larger weighted sum of antecedent beliefs leads to greater levels of co-production. Rather, different *combinations* of beliefs cohere with different levels of SST co-production. Thus, this belief model departs from the existing service and marketing literature, which uses variance models to explain co-production levels (e.g., Ngo and O’Cass 2013; Tsou and Hsu 2015).

A corollary of the idea that distinct sets of beliefs underlie distinct levels of SST co-production is that a change in SST co-production level is accompanied by a change in underlying beliefs, as one reviewer suggested. While this idea requires empirical support,⁵ it has theoretical support in the archetypal theory of organizational design⁶ (Greenwood and Hinings 1988), which posits that changes in organizational structures are accompanied by changes in beliefs. According to Miller (1996), the originator of configurational theory, organizations need not make giant leaps from one configuration to the next because “... configurations overlap along many dimensions and are usually connected on a snake-like surface” (p. 506). The four configurations in Table 1 may illustrate how configurations connect through snake-like overlapping beliefs.

⁵ Practitioner articles that document changes in SST offerings can be useful to test this idea. One example quotes the CEO of McDonalds: “For 59 years we asked customers to fit around our business model. Here’s our menu and here’s the way you can interact with us... But peoples’ desires are changing ... Ideas are [now] encouraged and staff motivated to act fast, avoiding hierarchical structures ... The company is also improving its technology: self-service kiosks, mobile ordering and payments” Maidment (2015). This quote alludes to changes in level of SST co-production offered, in views of the customer, and in competing values.

⁶ Organizational structure specifies what choice situations are available and to whom they are available (Beyer 1981). We view the SST co-production level as an aspect of organizational structure since it specifies what customers can and cannot do themselves.

Relatedly, if different levels of SST co-production cohere with different sets of beliefs, then an assessment of the newness of an SST-based service should take into account the degree of belief change. An SST-based service can be likened to an iceberg: the portion of the iceberg that is manifest (e.g., hardware/software functionality, customer activities) rests on a portion that is hidden (i.e., a latent set of beliefs). If one compares employee checkout and customer checkout of books in a library, for instance, the difference between the two may seem small at the manifest level, but the difference is vast when compared at the latent level of beliefs about competing values, customers, and knowledge. Thus, current frameworks that assess newness of SST-based service systems based on changes in manifest aspects such as physical facilities, processes, and information systems (e.g., Stuart 1998; Tax and Stuart 1997) should be expanded to consider changes in beliefs about competing values, customers, and knowledge.

The ethics and politics of customer representations

This article suggests that managers may view customers with varying levels of personalization, from members of a faceless mass to a homogenous collective to an assortment of unique individuals. This qualifies Huang and Rust’s (2013) assertion that “IT-related service is customer-centric” (p. 252) by suggesting that there are qualitatively different levels of customer-centricity, depending on how much of the customer is seen. For instance, the four groups of call center managers in Di Mascio’s (2005) study all proposed IT-related service, but each group saw ‘more’ of the customer.

More importantly, this article suggests that how the customer is viewed has ramifications for the ethical treatment of customers in SST decision-making. The burnout literature shows that depersonalization occurs when employees feel they treat customers as impersonal objects, not caring what

happens to them (Maslach and Jackson 1981). Depersonalization is hence akin to dehumanization (Garden 1987) in that it corresponds to a lack of concern for others' problems; acts of cruelty can even be performed on people who are not viewed as human (Osofsky 2005). While this article uncovers how the degree of personalization shapes one SST-related decision (the level of co-production), further research is needed on the role of personalization in other decisions relating to technology-based service delivery; this research would counterbalance the existing literature's focus on ethical issues in face-to-face service delivery (e.g., Schwegler and Hartline 2005).

Intertwined with the ethical aspect of envisioning customers is the political aspect (Heywood and Sandywell 1999, p. x). By linking how customers are viewed (motivation, ability, personalization) with the independence granted to the customer, this article introduces the notion that the choice of level of SST co-production embodies power relations between SST decision-makers and customers. This notion accords with Winner's (1985) idea that the design of technological artifacts that affect how people behave embodies assumptions – conscious or unconscious, intentional or unintentional – about power relations between people. This notion is typically overlooked in the service literature, which tends to focus on power differences between customers and firms at the macro level, and between customers and service providers at the interpersonal level (e.g., Bitran and Hoehch 1990; Lengnick-Hall 1996; Menon and Bansal 2007; Rafaeli 1989; Rosenthal and Peccei 2007). Bitran and Hoehch (1990), for example, recognize that requiring customers to queue is a way of subordinating customers, but they seem to be aware only of the individual servers doing the subordinating, not the managers designing the queue. Future research could explore decision-makers' conception of power relations between themselves and their customers, and how it impacts other aspects of SST decision-making.

Epistemologies of SST-based market exchanges

The SST belief model illuminates the role of epistemological beliefs in SST decision-making. The marketing literature has long recognized the role of knowledge in exchanges (e.g., De Luca and Atuahene-Gima 2007; Johnson et al. 2004; Madhavaram et al. 2014), even stating that knowledge is the fundamental unit of exchange (Vargo and Lusch 2004). This literature has also examined the role of isolated aspects of knowledge, such as the impact of learning orientation (loosely related to our malleability aspect) (Baker and Sinkula 1999; Sujana et al. 1994), speed of learning (Lapre and Tsikriktsis 2006; Riddington 2002), and source of knowledge (Blazevic and Lievens 2008; Lord 1994) on individual- and firm-level market exchanges.

This literature has nevertheless treated knowledge as an 'objective' phenomenon with fixed, objective properties – that is, from a realist perspective in Burrell and Morgan's (1979) sense – overlooking that beliefs about knowledge may vary, thus leading to different forms of market exchanges. For example, Johnson et al. (2004) asked managers to assess their firms' level of knowledge about various aspects of supplier management, but overlooked the possibility that assessments may have depended on whether managers believed knowledge resided within repositories and/or employees. By drawing on the fact that beliefs about individual aspects of knowledge can vary (Perry 1968; Schommer 1990) and that epistemological beliefs influence all practices involving the creation or application of knowledge (Ekstrom 2002), the present article shows that variations in knowledge *beliefs* will produce variations in one aspect (co-production level) of an SST-based marketing exchange. Admittedly, this article has proposed only some knowledge beliefs that could influence SST-based exchanges, so further work might explore whether other types of beliefs impact other decisions about such exchanges.

To say that epistemological beliefs vary between individuals/firms is not to imply that these beliefs are unvarying across contexts. On the contrary, these beliefs may change with context. Di Mascio (2005) observes that one call center manager, when speaking about the accounts receivable aspects of the center's work, imagined using the website to help customers provide answers to routine queries, but when speaking about the product-ordering aspects of the center's work, imagined using the website just to provide email access to the call center, since sales representatives were required to teach customers how to use the products. In other words, this manager offered customers different levels of independence depending on customers' task requirements, possibly because the manager saw knowledge contained in invoices – standalone documents – as isolated facts that could be extracted, but saw knowledge about products as too complex to extract from salespeople. Future work could explore how knowledge beliefs develop, and the degree to which these beliefs are shaped by existing service delivery mechanisms.

Future research

The SST belief model provides ample opportunities for future empirical work. Some have already been mentioned, but we will comment on three additional ones in particular. First, while an attempt was made to demonstrate the face validity of the belief model, rigorous empirical testing of the model is required to assess completeness of beliefs,⁷ and to elucidate configurations of beliefs corresponding to different SST co-

⁷ An example of another belief, which one reviewer noted, related to the resources that customers bring to an SST transaction (e.g., iPhones). Hilton and Hughes (2013) describe these resources more fully.

production levels. The Di Mascio (2005) study produced four possible configurations, but whether these configurations pertain only to the call center industry or whether they generalize to other industries is unknown. This testing can be done quantitatively using cluster analysis: items to measure competing values are already available (Cameron and Quinn 2006); items to measure knowledge beliefs can be adapted from Schommer (1990); but, as far as we are aware, items for customer-related beliefs require development. Alternatively, a qualitative comparative analysis of manager/organization texts about SST co-production can be used to elucidate configurational structures. Analysis of these texts is appropriate because people's beliefs about an issue are reflected in their communications about that issue (e.g., Rosa et al. 1999). Indeed, Table 1 displays an elemental form of qualitative comparative analysis of one text.

Even though this article has focused on modeling beliefs underlying one decision involved in service design (the level of SST-enabled co-production), the three characteristics of SSTs upon which the belief model is based (i.e., designed for customers, to achieve a desired organizational outcome, and involving a change in the geography of organizational knowledge) may apply to decisions about other service technologies that can be flexibly designed to give customers varying levels of autonomy (e.g., face-to-face service delivery processes that offer varying levels of customer involvement). Thus, future work might explore whether these beliefs operate in decisions about these other service technologies.

More work is also needed to explore the relationship between external industry beliefs and norms, and internal managerial/organizational beliefs. Organizations do not exist in isolation: they import and adapt ideologies and values from their external environment, and they manufacture and export ideologies and values into the environment (Beyer 1981). For example, Rosa et al. (1999) show how consumer and producer beliefs interact to form a standard design of minivans, and Garud and Rappa (1994) show how the beliefs of researchers and regulatory agencies interact to form a dominant design of cochlear implant. Kaplan and Tripsas (2008) describe the general process by which the technology beliefs of an array of actors (organizations, vendors, industry associations, and competitors) shape a technology's trajectory during its lifecycle and the design that ultimately prevails. Future research could apply the Kaplan and Tripsas (2008) process to uncover the emergence of industry 'norms' in SST co-production levels, which one reviewer noted.

Implications for practice

On a practical level, managers making decisions about the level of SST-enabled co-production in their organizations can use the dimensions of the SST belief model to surface

assumptions – their own and others' – about organizational purpose, customers, and knowledge. They can use questions already developed by Cameron and Quinn (2006) to assess beliefs about desired organizational outcomes, and they can reflect on their views of customers' autonomy and speed of learning, and whether they believe the knowledge required for the SST is simple to extract and program.

Surfacing these assumptions is important, as differences in assumptions held by various decision-makers can cause problems during SST design and implementation. For example, Salomann et al. (2007) observe in an SST implementation that managers, programmers, and interaction designers have their own view of customers that can create "endless debates" (p. 314); Suchan (2001) also documents difficulties in implementing a distance learning technology in a university where administrators and educators have different unarticulated beliefs about purpose, students, and knowledge. Surfacing and discussing differences in assumptions of individual stakeholders may help smooth the design and implementation process, and may also inform managers about alternative beliefs that could produce alternative SST decisions.

In particular, the belief model may encourage managers involved in SST co-production decisions to question how they envision customers. Are customers anonymous, or are they human beings with ability and motivation? Sheth et al. (1988) note that "[g]uilty marketing practitioners have quite sincerely stated that they honestly did not realize that their actions could possibly create ethical problems". Consciously thinking of customers as individuals may help managers ensure their actions do not create ethical problems in SST design.

The belief model may also help managers who are changing the level of SST co-production to identify the degree of organizational change required, taking into account the beliefs underlying the new service. Configurations are like paradigms of thinking, so conceptual change (Posner et al. 1982) methods may be required. In general, these methods comprise an awareness phase that probes current mental models, a disequilibrium phase that introduces anomalies in low-order models, and a reformation phase that presents a model that resolves the anomalies (West 1988). Specific aspects of SST belief models that could be probed include managers' beliefs about desired organizational outcomes, customers, and knowledge.

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