University of the West of England

Hughes, T.[1a], Hilton, T.[2], Little, E[1]. & Marandi, E[1].

Working Paper No. 1

Developing a Co-Production Model for Self-Service Technology

The perspective of service-dominant logic (SDL) provides a novel framework to consider the respective roles of both customer and supplier in using Self Service Technology (SST). The effect of the introduction of self-service technologies can be seen to move resource inputs away from the supplier to the customer. Based on a literature review, the authors have developed a model that seeks to explain co-production, using SST, from the customer perspective. This includes motivational factors; the resources utilised by the customer that combine with those of the supplier organisation at the technological interface; and the outputs, as perceived by the customer. The contribution of this research is in building our knowledge of how consumers participate in 'co-creating value' when using SST. The findings from our research will be of potential interest to organisations everywhere that are developing the use of SST, and to policy makers interested in the impact of technology on different segments of society.

ISBN:
978-1-86043-450-1

[1] Bristol Business School,
University of the West of England

[2] Westminster Business School,
University of Westminster

[a] Corresponding author: tim.hughes@uwe.ac.uk

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A Marketing Research Forum Series Working Paper,
University of the West of England, Coldharbour Lane, Bristol, BS16 1QY

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INTRODUCTION

Technological developments have rapidly impacted on many areas of commercial activity over the last decade. One feature of this is a trend towards technology enabled self-service, with suppliers of goods and services encouraging customers to interact with machines rather than staff in conducting transactions. One of the most ubiquitous forms of self-service technology (SST) has been with us for many years: the Automatic Teller Machine (ATM) or cash machine, as it is commonly known. Other more recent additions include self-serve checkouts in supermarkets; self check-in at airports and self-serve petrol pumps. However, it is the internet and the commercial development of the world-wide-web that have really accelerated the trend towards self-service, particularly in financial services and travel. In theory we can now manage most of our financial affairs; deal with most household service suppliers; buy most goods and services; and organise our holidays without directly interacting with a member of staff from the supplying organisation.

Considerable research has been done into various aspects of the impact of technology on customers and on the productivity of technology from a supplier perspective, focusing on factors that might determine the efficiency of the transaction. However, there has been little research into understanding the perceptions of customers of the role they are playing in the production process as they are increasingly required to serve themselves.

The discourse of service dominant logic (SDL) provides a perspective to consider this with its emphasis on the role of the customer as co-producer of value and the idea of the importance of operant resources in value provision. If, as SDL claims, the fundamental source of competitive advantage is operant resources then moving production tasks to the customer is of interest to marketers because the operant resources being employed are increasingly those of the customer, rather than the service provider's employees.

In this paper we will review relevant literature on SDL to show how it can be applied to the analysis of customer use of SST. We then combine this with literature on customer motivation to develop a model of co-production for customers' using SST.

SERVICE-DOMINANT LOGIC AND SELF SERVICE

The service-dominant logic of marketing (Vargo and Lusch 2004) has attracted a widespread and generally favourable response from marketing academics, and the ensuing debate has prompted a number of refinements, developments and amendments (Vargo and Lusch 2008a). Vargo and Lusch's original article draws its conceptual foundations from economics, and the concept that all commercial activity centres on exchange. Their starting point is the theory of comparative advantage, in which exchange is driven by specialisation. This specialisation facilitates innovation and improvements in productivity at a much faster rate than if individuals had to spread their attention across a variety of activities. This benefits everyone within the economy, since the whole system will generate greater value for less effort. Hence it is the development of specialised knowledge and skills that drives the creation of value. While traditional marketing theory has focussed on the production of goods, SDL shifts the emphasis to value in use. Value is only created when a service or

product is used. Thus the consumer and the consumption process is emphasised as the consumer is recognised to be a co-creator of value.

Co-creation and co-production

Co-creation and co-production are both important themes in SDL, but have distinct meanings. Co-creation relates to the value received by the customer through usage, consumption or experience. Co-production is seen as a component of co-creation (Lusch and Vargo, 2006) that relates to specific tasks undertaken by customers prior to or during usage. The customer is therefore always a co-creator but not always a co-producer:

> "Value obtained in conjunction with market exchanges can not be created unilaterally, but always involves a unique combination of resources and idiosyncratic determination of value… thus the customer is always co-creator of value. On the other hand the involvement in co-production is optional and can vary from none at all to extensive co-production activities by the customer or user."
>
> (Vargo and Lusch 2008a, p.8)

The customer is always co-creator in that value is only delivered at the time of use, consumption or experience and is therefore 'value-in-use'. Co-production relates to the role that the customer plays as an operant resource in creating value. From the supplier's point of view this contribution can be an important source of competitive advantage (Vargo and Lusch 2008b). In consumer goods there are many examples where the co-production element is limited, but this is not always the case, for example self-assembly furniture may require considerable expertise and effort from the customer as co-producer. In services there is often more scope for co-production, but the degree of co-production can also be seen to vary in different situations. For example, in having a haircut the customer may provide little input above specifying a certain style. The main producer of value is the hairstylist, who supplies a skilled operant resource. However, there are many examples of services where there is a high degree of customer co-production: self-service restaurants, supermarkets, on-line holiday booking to name but a few.

In a sense the customer almost always has to do something to achieve the outcome, but the degree of customer input may vary to a large degree between different products and services and also between different delivery channels for the same product or service. The customer is always co-creator, but co-produces to a varying degree. We would argue therefore that *co-production relates to the degree that the customer is active in doing something to achieve the desired outcome.*

This is why co-production is interesting and important in considering SST. Co-creation is a given, but the degree of co-production will depend on a number of variables: the knowledge of the customer, the usability of the system, the motivation of the customer, the availability of other options, the cost of alternative options etc. In using SST the degree of co-production is increased through the transfer of task-performance from employee to consumer (in b2c) or from supplier employee to customer employee (in b2b).

Operand and operant resources

Vargo and Lusch distinguish between two types of resource that figure in creating value. *Operand resources*, such as raw materials, are "… resources on which an operation or act is performed to produce an effect" (Vargo and Lusch 2004, p. 2). This type of resource is usually tangible, inert and passive, requiring input from an active agent in order to realise its value potential (Arnould, Price and Malshe 2006; Lusch, Vargo and Wessels 2008). In contrast, *Operant resources* are those that are employed to act on operand resources and on other operant resources in order to create value. These are usually intangible resources such as knowledge, skills and labour (Vargo and Lusch 2004; Arnould, Price and Malshe 2006). Neither type of resource has inherent value, but offers *value potential* that may be realised through its integration with other resources. *Service* is defined as the process by which operant resources are applied to operand and to other operant resources in order to create value (Vargo and Lusch 2008a). Since operant resources drive value creation, Vargo and Lusch state in their most recent version of the SDL the proposition that "Operant resources constitute the fundamental source of competitive advantage" (Vargo and Lusch 2008a, p.6). This is an amendment to the original proposition that "Knowledge is the fundamental source of competitive advantage" (Vargo and Lusch 2004 p. 9).

Operant resources, therefore, occupy a position of central importance in the SDL. However, the distinction between operant and operand resources remains relatively loosely defined, with significant differences in the use of the term by respective authors. The original definitions proposed by Constantin and Lusch (2004) make a distinction on the basis of the activity/passivity or a particular resource. There is a strong tendency in the literature to assume operant resources to be synonymous in broad terms with `knowledge and skills' (Vargo and Lusch 2004; King and Grace 2008; Layton 2008; Lusch, Vargo, and Wessels 2008; Michel *et al*. 2008; Vargo and Lusch 2008a). Ballantyne and Varey, however, challenge this generalisation by distinguishing between tacit and explicit knowledge. Tacit knowledge *consists* of "…employee know-how or competencies gained through observation, imitation and mutual experience…" whereas "…explicit knowledge is media-based and can be digitised, duplicated and circulated" (Ballantyne and Varey 2006 p. 340). Since tacit knowledge is used directly in creating value, Ballantyne and Varey classify this as an operant resource. In contrast, explicit knowledge is seen as a passive resource that must be accessed by active agents in order to create value, and hence is defined as an operand resource (Ballantyne and Varey 2006).

The physical characteristic of tangibility/intangibility is also frequently used to distinguish operand from operant resources, with the former generally being viewed as tangible and the latter intangible (Vargo and Lusch 2004; Baron and Harris 2008; Barnes *et al*. 2009). Again, this criterion has led to significant differences in classifying different types of resource. In classifying organisational resources, for example, Hunt (2004) classifies 'machinery' as an operand resource, Barnes *et al.* (2009) define 'innovative technology' as an operand resource, whilst Payne *et al*. (2009) see 'technology' as an operant resource. On the one hand, such resources are tangible and passive, requiring inputs from active agents such as human operators in order to function. On the other, both machinery and technology are active in the sense of producing effects or creating value, and so could well be

classified as operant resources. The fact that this takes place only through interaction with another active agent is also true of human service providers.

Thus self-service technology, as a service delivery agent, through which both organisational resources and customer resources are applied to the co-creation of value, provides a challenging area for considering the distinction between operant and operand resources. In considering this, the way that tacit knowledge becomes embedded and made explicit within the technological system needs further exploration.

Overall, the introduction of self-service technologies is intended to move operant resource inputs (usually made by staff) away from the supplier organisation towards the customer, in order to reduce service delivery costs and make services more accessible. This leads to a greater proportion of the customer's resources being used in the actual production of the product or service. The degree of co-production will impact both on the supplier's productivity and also on the customer's view of the value received.

CUSTOMER RESOURCE INPUTS

Table 1 summarises our review of the range of resources that customers may call upon in using SST:

Table 1: Types of customer input to the co-creation process

Type of input	Examples
Cognitive resources	Functional knowledge, product or service knowledge
Relationship resources	Family, consumer tribe, commercial and professional relationships
Physical resources	Perceptive ability, strength, energy, dexterity
Material objects	ICT hardware/software, credit/debit card

The cognitive resources available to the individual will impact on the way the individual approaches and interacts with technology. This covers both functional knowledge (e.g. ability to use the technology, follow instructions, and perform operations) and specific knowledge about the service or product being accessed.

In terms of functional knowledge, Davis's (1989) Technology Acceptance Model is well established and shows that individuals have varying degrees of enthusiasm and capability in using new technologies. Customers will usually use technology when they understand their role and what they need to do (Bitner *et al.* 2002). But some will be more anxious in using it than others and the degree of anxiety can be seen to be a predictor of usage (Meuter *et al*. 2003). Therefore some individuals will be more willing to experiment with new technologies than others. In this respect knowledge built through experience with the chosen technology is important. Lack of experience will provide a barrier to uptake (Gilbert *et al*. 2004). Jayasimha and Nargundkar, (2006) argue that the literature has underplayed functional literacy versus functional illiteracy in considering SST. The functionally illiterate will undergo significant emotional cost in trying out SST and therefore will avoid using the SST if possible.

This provides a challenge for companies that seek to introduce new self-service technologies where the appeal needs to go beyond those who are technically savvy (Salomann *et al*. 2006).

The nature of the functional cognitive resources required from the customer may be closely related to the usage of the service. First time usage requires the ability to navigate and work it all out. Successive usage requires the ability to recall previous experience and frequently the passwords and personal identification numbers for access. Therefore there may be separate issues around the knowledge required to access the SST and ongoing usage.

The customer's experience in relation to the complexity of the product or service concerned would also seem to be a key cognitive resource in relation to propensity for SST usage. For example a first time homebuyer (low knowledge and experience) confronted with a range of possible home loan products (complex) may avoid self-service, wishing to access person-to-person advice and support. A second time homebuyer with greater experience and knowledge may well be willing to use SST in getting a home loan, despite the product complexity.

The rest of the resource inputs identified in Table 1 are termed "relationship, physical and material". Arnould, Price and Malshe (2006) provide a framework for classifying customers' resources, in which operant resources are sub-divided into social, cultural and physical resources. With regard to the social and cultural, relationship resources are included in Table 1 to take in the social support of friends, family, commercial and professional networks that individuals may call upon in using technology. This could be as simple as asking a colleague for day to day advice or as complex as getting help to reinstate a crashed computer to good working order. Physical resources are important where skill or dexterity is required to operate the technology. While this aspect may often be taken for granted it may be particularly significant when considering the ability of old or physically disadvantaged people to use SST. Finally, we have included material resources, such as the availability of a computer or the possession of credit/debit cards, in Table 1. These are operand resources that are nevertheless essential for the customer in accessing SST in many situations.

SUPPLIER RESOURCE INPUTS

Table 2 summarises the supplier inputs that are explained in more detail below.

Table 2: Types of organisational input into the co-creation process

Type of input	Examples
Staff resources	Cognitive, physical and relationship resources of staff
System resources	Knowledge, skills, intelligence, memory embedded in systems (hard and soft)
Physical resources	Self-service equipment (central and supplementary) for customers and support staff
Servicescape	Self-service area, queuing and waiting spaces, website, support staff areas

The relative role of staff and system resources in customer service can be seen to be impacted by the use of SST. Well-trained staff provide a specialist source of tacit knowledge and they have access to codified knowledge (that is to say they should know where to go to get information if they do not have it themselves). As Frei (2008) notes, companies have more control over employers than customers and customers are harder to train, so tasks need to be dramatically simplified if they are to be taken out of the hands of staff. Therefore the way that knowledge is used and accessed in SST can be seen to be a central issue. Knowledge has a prominent role at centre of what firms' do (Kogut and Zander 1992). While the exact nature of knowledge has occupied philosophers over the centuries (Assudani 2005) a predominant theme in much organisational research has been the social and contextual nature of knowledge (Blackler 1995). Much knowledge is held collectively when people work in communities of practice. This "know how" is embedded in work practice and is critical in making knowledge actionable, it is only revealed in practice and is created out of practice (Brown and Duguid 1998). Lave (1993) points out that major difficulties occur when it is assumed that knowledge can be divorced from context. Knowledge always undergoes construction and transformation in use. Following from this stress on the value of knowledge through practice, a persistent theme is that there are different types of knowledge: practical experienced based and theoretical (Nahapiet and Ghoshal 1998). Polanyi's (1967) classification of tacit knowledge and explicit knowledge has been found to be a useful way of distinguishing the two. Tacit knowledge is highly personal and hard to formalize, deeply rooted and subjective. It contains two dimensions- personal skills or crafts 'know how' and secondly the cognitive dimension of beliefs, ideals values etc. (Nonaka 1994). Explicit knowledge on the other hand, is that which is expressed in words and numbers and shared in the form of data, scientific formulae etc. (Nonaka 1994). For Nonaka (1994) knowledge creation is a spiralling process of interactions between explicit and tacit knowledge. Through interactions knowledge gets converted from one form to another and evolves in the process.

Therefore, the movement of production away from staff to customers has implications for the way that knowledge is used and acquired. In using SST a supplier organisation can be seen to be substituting the often tacit and specialised knowledge of staff, as an operant resource, with that of the customer, who is likely to be less knowledgeable and less experienced in the company's systems. Hence the increased importance of explicit knowledge, that is embedded in the SST, as an operant resource in co-production. The degree of knowledge required of the customer can be seen to be inversely related to the simplicity of the SSL interface. The better the built-in knowledge of what the customer needs to know in operating the system and accessing appropriate products or services the less the customer needs to provide in terms of a cognitive resource.

In Table 2 we also identify physical and servicescape resource inputs from the supplier. The physical relates to the self-service hardware (as opposed to the software in which the knowledge is embedded) that is a necessary part of the transaction. This would include, for example, self-scanning equipment in supermarkets. Finally we identify the servicescape as a resource. This relates to the area in which the self-service transaction takes place. This may be a physical space, as in a supermarket or a website in the virtual realm.

THE INTERFACE

The resources of the customer and supplier are integrated at the SST interface. Previous work on resource integration tends to focus on the resource integration activities either of customers (Arnould, Price and Malshe 2006; Baron and Harris 2008) or organisations (Brodie *et al*. 2006; Lusch, Vargo and Wessels 2008; Barnes *et al.* 2009). Our interest is in how these come together.

To be effective the interface needs to be built on the basis of knowledge of how customers will use it (hence user testing). Speed, control, reliability and ease of use are consistently found to be important components of success in applying SST (Meuter *et al*. 2000; Dabholker *et al*. 2003; Shamdasani *et al*. 2008; for example). The success of the SST will depend on the match between the cognitive resources available to the customer and cognitive resources demanded by the features of the SST (Zhu *et al.* 2007). In this support and training may be particularly important and this highlights a potential area of differentiation between b2c and b2b contexts, in so far the support that can be drawn upon in the organisational context. Ease of use can be seen to have a number of components and relates particularly to the cognitive resources required of the customer. When multiple features are incorporated the customer's cognitive resources are more likely to become exhausted (Zhu *et al*. 2007). Thus in designing the interface getting the right balance between high technology and customer friendliness is a major challenge (Salomann *et al*. 2006).

Another aspect of the interface relates to customer knowledge collected on databases as a result of customer interactions with the system. It has been claimed that developments in technology have led to a shift away from the mass-market paradigm towards a world in which organisations can respond to the needs of individual customers (Peppers and Rogers 1993). When managers talk about the value of customer relationships they are talking about the information that they have on their customers (Evans and Wurster 1997). Kahan (1998, p 491) contrasts individual customer knowledge previously held by local staff with situations in mass markets where it is impossible to know each customer and databases "Only with the aid of sophisticated marketing database technology can we capture, analyse and act on the same interpersonal marketing opportunities first identified in these earlier and simpler times". Catalogue companies for instance use behavioural analysis based on the idea that past purchasing behaviour is the best predictor of future behaviour. Peppers *et al*. (1999) argue that technology has the potential of to be more effective than personal service, citing Amazon.com as an example. Indeed O'Malley, and Mitussis (2002) claim that the general interest in relationship marketing in mass markets has largely been stimulated by developments in technology enabling storage and analysis of customer data. Through collecting appropriate customer information at the interface is it possible to build up knowledge of an individual's needs in the same way that an individual member of staff might do in building a relationship?

ATTITUDINAL PRECONDITIONS TO USE OF SST

The discussion so far has focused on SDL in relation to SST covering co-production, operant resources and the resource integration process. However, past research into

SST usage has shown that attitudinal factors will impact on the individual's experience in usage of SST. These include: the need for self-control and preference for human contact (Bateson 1985); social anxiety and the need for social interaction (Dabholker and Bagozzi 2002); technological anxiety (Meuter *et al*. 2003); insecurity and the need for assurance (Elliott and Hall 2005). When given a choice customers may often choose personal service over self-service. Makarem *et al*. (2009) researched service encounters involving both some self-service (high tech) and some human contact (high touch) and found a strong preference for touch over tech. In particular, they found a stronger likelihood for those using high touch to give positive word of mouth and additional business than for those using self-service. This is particularly surprising given that their sample consisted of young people (students) who might be expected to be more positively disposed to self-service than older groups. The point here is that customer motivation is complex. Individual psychological factors may come into play in customer choice of high touch or high tech. Simon and Usunier (2007) stress the importance of different cognitive styles. Their research on services where there was a person-to-person alternative to SST confirmed that individuals stronger in rational engagement more positively preferred SST and those stronger on experiential engagement tended to prefer interactions with service personnel. The perceived value of person-to person interactions to both the supplier and customer may go far beyond the actual transaction.

Hence, the need to combine the ideas from SDL with work on customer attitudes in order to explain the way different people approach the use of SST. The nature, structure and functioning of attitudes is a matter of complex and continuing debate in the social psychology literature (Crites *et al*. 1994; Fabrigar and Petty 1999; Ajzen 2001; Crano and Prislin 2006). It has variously been proposed that attitudes consist of one, two or three components (cognitive; cognitive-affective; cognitive-affective-conative).

Cognitive models of attitudes

Fishbein and Ajzen popularised a cognitive model of attitude through their theories of Reasoned Action (Fishbein and Ajzen 1974, which was developed into the theory of Planned Behaviour (Ajzen 1985). This and related theories are based on the assumption of `rational man,' whose motivations to behave can be understood through expectancy theory (Fishbein and Middlestadt 1995). In expectancy theory, the strength of motivation to behave in a certain way is a function of the valence (preference) for a particular outcome multiplied by the predicted probability that the behaviour will result in that outcome (Van Eerde and Thierry 1996). Attitudes are the cognitive mechanism by which experience of objects and situations is retained in order to decide valences and predict probabilities in new situations. The expectancy-value model of attitude holds that subjects form beliefs about an object through experience. These beliefs associate object attributes with particular outcomes on which the subject places a certain level of value. The subject's attitude towards a particular object will be determined by the extent of the value that the subject places on this attribute, and beliefs about the strength of the association of that value with the given attribute (Ajzen 2001). Although this perspective allows that affective responses to an object or situation will impact on the attitude, these responses are integrated into the attitude through cognitive processing (Fishbein and Ajzen 1975; Schwarz and Clore 1983; Fishbein and Middlestadt 1995; Winkielman *et al*. 1997).

The attitude itself therefore remains a cognitive phenomenon, which is primarily determined by, and can be measured through, beliefs (Greenwald and Leavitt 1984; Tsal 1985; Fishbein and Middlestadt 1997).

Cognitive-affective models of attitude

Although there is considerable support in the literature for theories of reasoned action and planned behaviour, models of attitude that are based purely on cognitive processing have been heavily criticised (Haugtvedt 1997; Miniard and Barone 1997; Preister and Fleming 1997; Schwarz 1997; Tiedens and Linton 2001). Various empirical studies have yielded a clear distinction between affect-based and cognition-base attitudes (Edwards 1990; Millar and Millar 1990), and between affective and cognitive components of attitude (Crites *et al*. 1994; Olson and Zanna 1993; Crano and Prislin 2006). A number of these studies have suggested that affective components or antecedents of attitude constitute the primary influence on overall attitude (Batra and Stayman 1990; Edwards 1990; Cervellon and Dube 2002; Huskinson and Haddock 2004; Bakamitsos 2006). It was noted above that cognitive models of attitude do allow that affect forms an influence on attitude, through the integration of affective responses into the cognitive evaluation of an object. The cognitive-affective perspective differs from the cognitive model in proposing that affective responses shape, or even bypass the cognitive evaluations of an attitude object.

Various mechanisms by which this process occurs have been suggested. The Elaboration Likelihood Model (ELM) has been widely accepted in the literature on attitude change and persuasion (Olson and Zanna 1993; Ajzen 2001; Crano and Prislin 2006) According to ELM, subjects will only systematically analyse persuasive messages if they are motivated and able to do so. The Heuristic/Systematic Model is similar to ELM in holding that attitude formation can occur through dual processes. However, in HSM, subjects use heuristics, to mitigate the difficulty of effort involved in attitude formation (Olson and Zanna 1993; Crano and Prislin 2006). These heuristics are often based on actual or predicted emotional responses (Schwarz and Clore 1983; Pham 1998). There is also considerable empirical evidence that attitudes are formed subconsciously, as well as consciously, through exposure to a phenomenon (Olson and Zanna 1993; Crano and Prislin 2006).

Bias or selectivity in the perception and interpretation of stimuli provides another vehicle through which affective responses to objects shape cognitive evaluations. Moods or emotions have been found to influence the tendency of subjects to engage in lengthy or complex cognitive processing or elaboration. Even in circumstances where subjects engage in conscious and complex evaluation of an object, mood and emotion may influence the outcome of this evaluation. Various studies have found that a subject's affective response to an object will influence their perception of it (Hamilton *et al*. 1990; Eagly and Chaiken 1992); their retention of it (Echabe and Rovira 1989; Ross 1989; Olson and Zanna 1993), and interpretation of `hard' information about it (Liberman and Chaiken 1992; Silverstein and Flamenbaum 1989) and hence shape cognitive evaluations.

The relative importance of affect and cognition may vary between individuals. Sojka and Giese (1997) presented evidence that 'thinking processors' were pre-disposed

to evaluate cognitively, whilst the attitudes of 'feeling processors' were based predominately on affective stimuli. It may also change with exposure to a phenomenon. Several studies have shown that experience of the attitude object decreases the influence of affect in attitude formation, as a subject's perceptions of their ability to engage in complex cognitive evaluation increases as they learn more about the attitude object (Songer-Knocks 1976; Haugtvedt 1997).

Cognitive-affective-conative models of attitude

The importance of experience and its impact on behaviour is brought out in conative models. This stream of research suggests that past behaviour may directly influence future behaviour through the development of automatic responses to certain objects – that under certain conditions, behaviour can operate independently of attitudes or behavioural intentions (Leone *et al*. 1999; Verplanken and Aarts 1999). Furthermore, Ouelette and Wood (1998) argue that, in stable conditions, habit constitutes a better indicator of actual behaviour than attitudes or intentions. Only in new or unstable conditions do individuals engage in the relatively onerous psychological task of controlled processing (Ouelette and Wood 1998).

A stronger challenge to the traditional `attitudes cause behaviour' approach, however, is posed by cognitive consistency-based theories of attitude formation and change, which propose that behaviour can actively cause attitude formation and change. The oldest and most commonly cited of these is Leon Festinger's (1957) theory of cognitive dissonance (Aronson 1992; Olson and Zanna 1993; Ajzen 2001; Crano and Prislin 2006). Following the performance of a particular behaviour, an individual may experience dissonance as a result of conflict between their various beliefs about the behaviour and their emotions corresponding to the behaviour. As a result they are likely to change those beliefs in order to rationalise the behaviour. While cognitive dissonance has been the subject of considerable debate, development and revision over the last fifty years (Beauvois and Joule 1983; Aronson 1999; Wood 2000; Jonas *et al*. 2001; Harmon-Jones *et al*. 2008) it is notable that few have questioned the idea in relation to the influence of behaviour on attitudes.

Various revisions alternatives and amendments to the theory of cognitive dissonance have been proposed. Bem (1965) offered self-perception theory as an alternative explanation of the behaviour-attitude causal relationship. This is theory states that an individual will infer their attitudes from their knowledge of past behaviour. Unlike in dissonance theory, where subjects consciously identify and resolve conflicting cognitions, this process occurs with little conscious cognitive processing. Aronson lists eight distinct `mini-theories,' which were developed between 1982 and 1990 in an attempt to elaborate on the Festinger's original one. The most widely accepted of these is self-affirmation theory, which posits that individuals are motivated to reduce dissonance, not because dissonance is motivating in itself, but because inconsistency between behaviours, emotions and beliefs threatens self-esteem. More recently, Harmon-Jones *et al*. (2003) proposed an 'action-based theory of dissonance' in which dissonance reduction fulfils an adaptive function. The theory focuses the role of decision-making in attitude formation and change, proposing that, having made a decision between alternative courses of action, an individual will exhibit bias in processing information relating to that course of action, hence

reinforcing a positive attitude towards the decision and the course of action it involves. Experimental and survey research has produced significant empirical evidence to support this theory (Harmon-Jones *et al*. 2008).

The debate continues about the motives for dissonance reduction, and the specific mechanisms through which it occurs. It is sufficient at this stage to note that academic research on dissonance has provided substantial empirical evidence that past behaviour in relation to an object influences beliefs, emotions, behavioural intentions and actual behaviour towards that object.

ATTITUDINAL OUTPUTS FROM THE PROCESS OF USING SST

The discussion above shows the complexity of customer motivation and suggests the need to include cognitive, affective and conative components in considering attitudinal preconditions that impact on individuals' use of SST. These components can also be useful applied in considering the users perception following the use of SST.

Cognitive evaluation

The customer uses SST because he or she wants to access a product or service and therefore a prime output from the customer's point of view will be their cognitive evaluation of the value received in relation to the effort put in. In considering this it is useful to be aware of the literature on perceived justice. Much of what we know about customer perceptions of justice has been gained within the narrow context of complaining behaviour and service recovery (Baron, Harris and Hilton 2009). However, evidence also exists to suggest that perceptions of justice, particularly at the macro, or industry, level, influence customer evaluations of service consumption experiences beyond that of service recovery (Aurier and Siadou-Martin 2007). Of relevance here is the idea of distributive justice. Customers evaluate the outcome based upon need (to ensure everyone receives what they require), equality (of allocation and treatment) and equity (considered to be a balance of rewards compared with their own contribution such as time, money and effort.

In addition to the outcome achieved, customers may also be concerned with other aspects of justice. Procedural justice relates to the fairness of rules, guidelines, policies and procedures implemented by the service provider to which they have to conform. Interactional justice is about the interpersonal behaviour of the service provider, and while it less directly applicable in the SST context, it may have some relevance in considering situations, where interactions with staff have been required because intervention has been necessary to make up for system failures or the need for greater customer support in using the technology. Finally, there is the concept of Macro-justice, which is a judgement based upon cumulative experiences with the service industry/sector. This is distinguished from the other three components which are transaction-specific. Macro-justice judgements could include a lack of choice or competition or unfair managerial practices as industry level (Aurier and Siadou-Martin 2007). These perceptions may well be applicable where the introduction of SST requires customers to increase their co-production role, particularly where there is no choice, or where there might be a large financial cost associated with reducing their co-production role.

Affective response

This type of response relates to positive feelings of satisfaction that may result from the use of the SST or conversely from negative feelings, such as frustration. The importance of fun is mentioned extensively in the literature in relation to usage of the SST interface (Dabholker and Bagozzi 2002; Dabholker *et al*. 2003; Curran and Meuter 2007, for example). This is found to be the case in activities as diverse as self-scanning (Marzocchi, and Zammit 2006); online shopping (Childers *et al*. 2001) and self-service banking (Curran and Meuter 2007). Conversely, frustration or anger may be the emotional response as a result of a bad experience with SST. This may have an effect on self-image, particularly if the bad experience of SST is public, such as in the work place. The role of emotional response and memories around consumer experiences are both prevalent in the consumer literature (Pine and Gilmore 1998 and 1999; Schmitt 1999) and would be expected to be components of the SST experience for customers. Finally, the customer perception of the supplying firm will be influenced by the degree to which the customer perceives that they have participated in production (Bendapudi and Leone 2003).

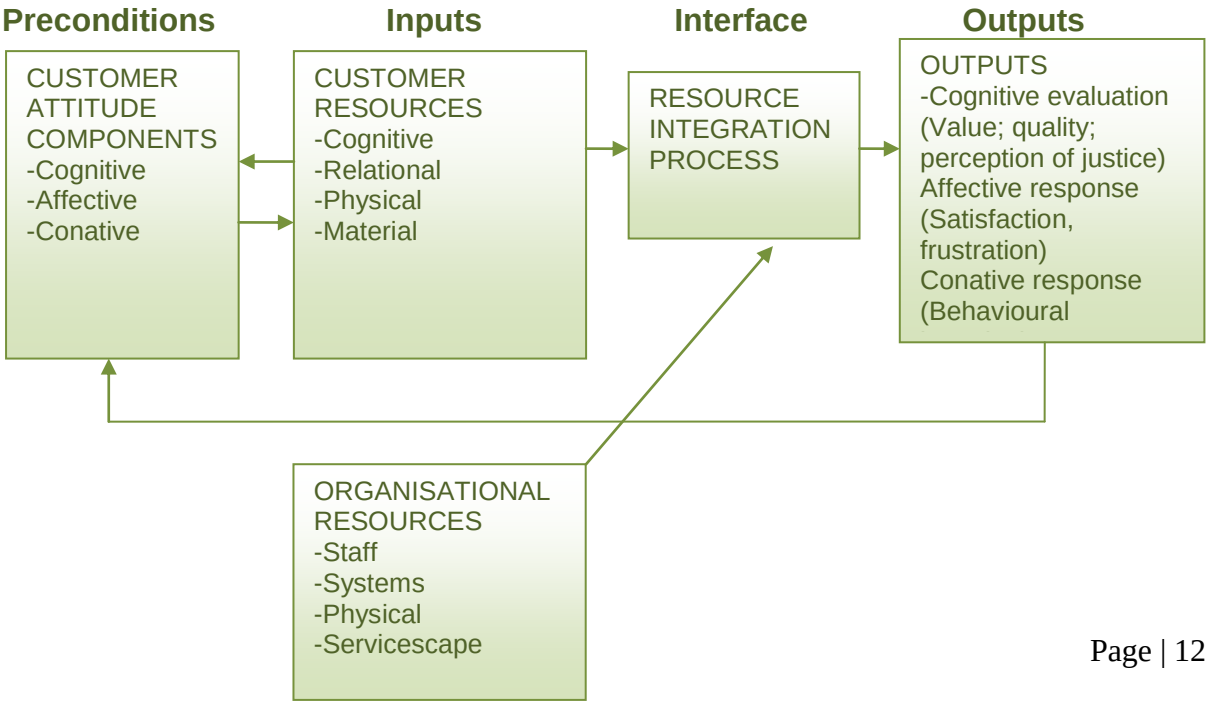
Conative response

This relates to how an experience of using SST impacts on the user's future behaviour in using SST. This links each experience of using SST back to the preconditions.

CONCEPTUAL FRAMEWORK

Based on our review of existing literature the authors have developed a conceptual framework that seeks to explain the process of co-production, using SST, from the customer perspective. This encompasses the customer's motivation; the resources utilised by the customers that combine with those of the supplier organisation at the technological interface; and the outputs, as perceived by the customer:

Figure 1: The process of co-production using SST



The Organisational Resources box is included in the above model, but is represented by a dotted line. The reason for this is that the focus of our research is to look at the customer experience of using SST, as represented by the four boxes in the top half of the framework. Of particular interest is the Resource Integration Process, representing a gap in knowledge, concerning how the resources of the customer are combined with those of the supplying organisation.

RESEARCH DIRECTIONS

Future research is needed to confirm the elements of the proposed framework and, in particular, to investigate the resource integration process. We would argue for the need to use qualitative methods to further explore the framework and quantitative methods to confirm the elements in the model, relating them to how they impact on different customer groups.

The following areas, propositions require further investigation:

- The components of customer attitude in motivation for use or non-use of SST
    - Customer propensity to use SST will be impacted by their knowledge (mainly tacit) of using technology in general and by their knowledge (mainly tacit) gained as a result of using the particular SST.
    - Customer propensity to use SST will be impacted by their knowledge (mainly tacit) concerning the product or service being delivered.
    - Customer propensity to use SST will be impacted by emotional preconditions, such as preference for human contact and attitudes towards the use of technology.
- The nature of customer resources employed in using SST
- The resource integration process involved in using SST
    - Customer perceptions of the ease of use of the SST interface will be impacted by the quality of the explicit knowledge embedded in the system of how customers use the system.
    - Where there is ongoing use of the SST system the value perceived by the customer will be impacted by the quality of the individual customer knowledge (explicit) collected by the system.
- Customers' outcome evaluations of their experience of using SST and how these impact on their attitudes towards future use of SST
    - The outputs experienced by the customer will impact on the customer's emotional readiness to use SST in the future.

IMPLICATIONS

If, as SDL claims, the fundamental source of competitive advantage is operant resources then moving production tasks to the customer is of interest to marketers because the operant resource being employed are increasingly those of the customer, rather than the service provider's employees. This raises the question of how providers can use the operant resources of their customers effectively and furthermore, how supplier organisations can combine the operant resources of their customers with the operant resources of their employees to co-produce value. Therefore understanding how value is created for and experienced by customers in co-production is crucial. Balancing the supplier and customer input according to the circumstances and type of customer may be the key to this.

As technology facilitates an ability to leverage the operant resources of consumers service organisations will need to articulate exactly what knowledge, skills and capabilities they require of their customers and what the associated learning will involve. This learning curve will need to be factored in as customers develop their skills as operant resources in the same way that an organisation would have to plan the training and development of their own employees.

The findings from research in this area will therefore be of interest to organisations, both in the private and public sectors that are developing the use of SST. This applies to many service industries, such as financial services, travel services and retailing. It is also relevant to public sector organisations in reducing costs through automating access such as council services, the tax raising authorities, health service providers and many others.

The findings will also be of interest to policy makers concerned with understanding the implications for consumers of the increasing use of technology across many commercial spheres. This in particular relates to issues with regard to social exclusion of minorities, who may not be able or willing to operate new technologies.

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