The Use of Self-Service Technologies for Trust Forming Behavior within the South African Fresh Produce Industry: A Case Study Approach

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Abstract--**When using self-service solutions to deliver services the challenge is to retain the trust of the end user. This is specifically the case when dealing with end users in the fresh produce market environment. This sector has not seen the adoption of self-service technologies specifically in southern Africa. In this paper we propose a model to enhance our understanding of trust formation using self-service technologies. A qualitative research approach, based on a case study (and many years of experience in this field), was followed to create the model. This case study offers insight into how the dynamics of the product, supporting services and the technology shapes trust forming behavior.**

I. INTRODUCTION

The growing digital interconnectedness of people and things[1] is shaping our interaction and relationships with the world around us. Increasing capacity of networks to transmit more data at lower costs, high availability infrastructure, increased mobility and powerful consumer devices are fueling the growth of electronic service delivery.

We are searching, transacting, using services, creating information and interacting with products in new ways. But the "rich set of signals that can be cognitively exploited to access reciprocal 'moral' attitudes"[14] that are present in face-to-face/physical interactions are being replaced by "electronic" signals through self-service applications. This removes the multitude of cognitive signals used by the trustor to determine trusting intentions of trustee (object or environment).

The focus of this study fell on a self-service solution in a supply chain already functioning with very high levels of trust between the participants. The fact that there already exist these high trust levels, should provide for the perfect industry to implement electronic exchanges relying on self-service. One would expect that these high trust levels could easily be "ported" to an electronic channel. This has not been the case.

The problem the authors intend to address with the proposed model is to establish and maintain trust between all the role players in the fresh produce market, but especially between the buyer/seller and market agent. This is very important, because this sector has not seen the adoption of self-service technologies (specifically in southern Africa). Smart phones (read apps) have become an important communication technology in the hands of those who never used it before and needs to be managed effectively.

[1] Referring to "the internet of things." http://www.theinternetofthings.eu/

II. KEY DEFINITIONS

The following key definitions form the basis of the discussion.

- Self-service is defined as: ".....any facility that enables consumers to produce services for themselves without assistance from firm employees"[1].
- Self-service technology (SST): The technology supporting, automating and facilitating the service work flow.
- Trust is defined as follows: "Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another." [16].
- Fresh Produce Agent(FPA): "...means an agent acting as such with regard to any agricultural product....on the basis that the risk of profit or loss at all times remains with the principal..." [15]. The agent charges an ad valorem commission for this selling service to the grower(principal).
- The buyer: For the purposes of this discussion a buyer is defined as the party purchasing the produce and taking over ownership from the grower.
- The grower: The grower is the owner of the produce being sold. Also referred to as the principal in the Act [15], the grower carries the ownership and risk until the product is sold by the FPA to the buyer.

III. METHODOLOGY

A qualitative research method was used, based on a review of the literature as well as a single case study and many years of experience in this field. According to [18], single case studies allow the researcher to do an in-depth investigation of phenomena as to provide a rich description and understanding. There have been a number of seminal single case studies within information systems over the years such as the work by [7] and [9]. Case studies are best suited for environments that contains "...more variables of interest than data points..." [17]. Social aspects like trust, as in this case, typically falls into this category. The following quote highlights the fact that trust research cannot be approached in a one dimensionally fashion:

"To be most valuable, we believe a conceptualization of trust constructs should be cross-disciplinary in nature. By creating a cross-disciplinary set of trust concepts, work by researchers in one field could be compared to work in other

fields. In this way, researchers will make cumulative progress on trust." [11].

To evaluate the case study [9] (As quoted in [17]) offers the following criteria:

- The case study must be interesting;
  It was found that the area of trust research contain many interesting phenomena. What the researcher did discover was that the commission selling system in South Africa is a remarkable example of a high trust business model. The consolidation of so many different stakeholders creates a very interesting research context. The fresh produce industry in South Africa is under researched and more interesting elements are bound to be discovered.
- The case study must have sufficient evidence;
  The case study focussed on major players within the industry. Triangulating involved the use of industry documents, academic articles and interviews. The research question originates from ongoing research into trust forming behaviour within electronic exchanges.
- The case study should be complete;
  A broad collection of relevant industry material were collected and consulted. The business rules and work flow underlying the case study is the same for other businesses operating within the markets itself. A single case represents a whole section of the supply chain.
- The case study must be consider alternative perspectives;
  The case itself followed a broad holistic approach, not only focussing on the transactional environment itself but on the wider social interaction of the participants within the self-service environment.
- The case study should be written in an engaging manner.
- The case study must contribute to knowledge;
  The study had a strong exploratory focus. Given the fact that not a lot of research has been done in fresh produce markets, plus the fact that it is a very unique case, contributes to our knowledge of trust.

IV. SERVICE FRAMEWORK

Technology merely supports a service's work flow. The ability of the technology to compliment trust within the work flow of a fresh produce market requires a careful analysis of the various role players and their service needs. The term self-service technologies is in some way misleading. It is not about the implementation of technology(only). Reference [3] indicates that the target of self-service strategies is not only aimed at cost savings, but to create convenience for the customer. It is not about the provision of a complimentary parallel digital services channel. It is about delivering "products" and serving the customer in a holistic manner.

Traditionally services were provided directly between the customer and service employees. Tthis is still the case in the fresh produce industry. Self-service as a delivery method has gained traction in other industries assisted by the increased ability of technology to provide services electronically [13]. But self-service needs to be seen as an evolutionary process. A process that takes into account the unique characteristics of the specific industry it needs to serve. Table 1 indicates the evolutionary processes we have observed in certain industries. Different industries are affected differently by the implementation of self-service. For example some industries like banking, retail shopping and airline ticketing has seen the establishment of electronic interfaces to provide services.

What is also apparent from all the examples listed in Table 1, are that behind the service interface lies physical infrastructure, multiple technologies, 3rd party service providers, people and logistics. This is the "unseen" portion of self-service delivery. But it is exactly these elements that ultimately determine the success of the service experience.

The success of the self-service depends on a customer centric view as well as recognition of the broader service channel elements.. For this this reason, self-service technologies are best viewed as an eco-system. An environment in which people, processes and technologies all contribute to self-service's functional success.

TABLE 1 : EVOLUTION OF SERVICE. FROM [3]

Service Industry	**Human Contact**	**Machine Assisted Services**	**Electronic Service**
Retail banking	Teller	ATM	Online banking
Grocery	Checkout Clerk	Self-checkout	Online order/pickup
Airlines	Ticket Agent	Check-in kiosk	Printing boarding pass
Restaurants	Wait person	Vending machine	Online order/delivery
Movie theater	Ticket sale	Kiosk ticketing	Pay-for-view
Book store	Information desk	Stock availability terminal	Online ordering
Education	Teacher	Computer tutorial	Distance learning
Gambling	Poker dealer	Computer poker	Online poker
Retail store	Checkout clerk	Self-checkout station	Online shopping

The challenge facing self-service in general is that the interaction with the organisation is potentially reduced to electronic interfaces as a singular contact point. The emphasis on deliberately including trust elements into the interface obviously is very important.

A. The FPA service environment

The service environment of the FPA is characterized by a well-established work flow and role definitions of the participants. As in the examples above, the FPA's service environment is a combination of logistics, people, processes and legal requirements. This can be summarized as follows:

- PEOPLE
  The various functions of people their roles and rules are known by the various participants. All participants are registered on the computer system so there are no anonymous users.
- PROCESS
  The transaction process is known by all participants. The process of delivery, handling and selling is highly regulated.
- TECHNOLOGY
  The platform that facilitates trade is not owned by any of the transacting partners but by an independent authority. This aspect becomes important when the objectivity, transparency and service recovery is taken into account.
- LEGAL
  A very strong regulatory environment supports the above. Reference [2] contrast party trust (trust in the other party) and control trust (trust in the controls). In order to exceed the trust threshold these two aspects needs to be present. Strong regulatory support is important to establish control trust and to provide the perception of fairness and objectivity in the service system as a whole.
  A well functioning legal environment contributes to the reduction in perceived risk. The fact that all role players have a known and clearly defined function reduces the possibility of opportunistic behavior.

According to [10] electronic enabled exchanges are particularly risky because:

- Buyer and seller are not known to each other.
- Platforms are less known(in the case of general e-commerce).
- Product access is limited.
- Participants cannot monitor the use of personal information.
- Participants cannot predict the behaviors of the other party.

Failure to explicitly address these risk elements have a negative impact on trust. The challenge posed to research is to provide guidance on how to replicate these aspects electronically. Simply "porting" a physical service environment to an electronic one is not the answer. This point will be elaborated on during the discussion of the model.

In the next section the services of the FPA is identified and placed in the context of both the grower and buyer.

B. Service of the Fresh Produce Agents:

It is important to note that a FPA offers two distinctly different services. A sales service to the grower (as a representative of the grower in the transaction) and a sales service tot he buyer as part of selling the physical product.

The agent "SELLS" two types of services:

- Selling a service back to the grower as part of selling the product.
- Selling a sales service with the actual physical product on behalf of the grower to the buyer.

The "smarter commerce" concept of [4] provides a basic view of the commercial process (Fig. 1). It is broken down into a buy/procurement (growing produce in the case of growers), marketing, selling and service (post-sales) stages. Within this process the selling and after sales service is the domain of the FPA. The FPA functions exclusively as a service intermediary but as part of the extended marketing function of the grower.

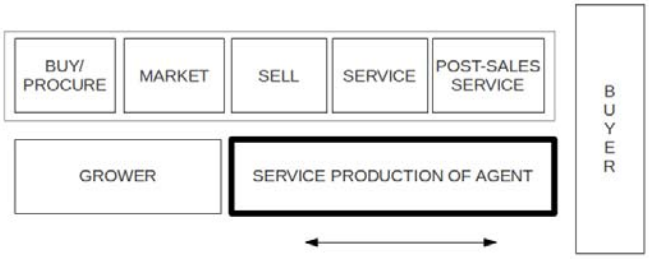

Fig. 1: The commercial process based on IBM's Smarter Commerce.

The importance of distinguishing between these services lies in the nature of functions performed under each. Different dynamics affects the relationships and requires different approaches facilitating trust signals. This ultimately impacts on the specific format of the SST that needs to be provided.

The traditional approach viewing the fresh produce supply chain as a "farm-to-fork" channel was based on the flow of the physical product only. This approach would simply view the process of growing – marketing – selling – service as one continuous flow. But within this flow there are distinct and clearly separable services (Fig. 1). Each one of these separate services requires a different approach to ensure trust is retained. This is a characteristic of these type of service industries that acts as an intermediary between physical production and physical consumption. Thus the approach should not be to focus on the physical product but on the service eco-system supporting the product flow.

A distinction is further made between the core service and the supplementary service following [6]'s "flower of

services". The flower of services centralizes the core service surrounded by the supplementary services that supports the specific core service.

Facilitating the service in a SST environment requires each one of these core and supplementary services to be electronically linked. In addition the facilitation of trust dynamics within each needs to be accommodated.

The following could be regarded as the core service and supplementary service to the grower:

Core service:
a) Price discovery (Core) : determination of the correct price to sell the produce.

Supplementary services:
b) Maintaining the relationship with the buyer of the product through communication.
c) The facilitation of the delivery and storage logistical processes.
d) Communication of relevant information.
e) Administrative functions.

From the above it can be seen that once the service is identified and unpacked the various key functional areas can be analyzed in order determine the trust dynamics supporting each. The way in which communication is done or how the physical payment is controlled are examples of areas that can influence trust forming behavior.

The following could be regarded as the core service and supplementary service to the buyer:

Core service:
a) Information: Price and product availability.

Supplementary services:
b) After sales service
c) Logistical assistance
d) Planning services

C. The Marketplace

Understanding the broader environment is important to contextualize service dynamics. The physical marketplace provides the components which makes up the key elements that needs to be present in electronic exchanges if the same trading dynamics are to be retained.

The physical market place consists out of multiple parties coming together creating the market dynamics of a competitive market through;

- Multiple products being produced and marketed.
- Multiple growers seeking to find the correct agent to sell his products(Search).
- Multiple agents competing for both the grower's product and the buyers.
- Multiple buyers competing for product(Search)
- A central point consolidating the activities into a physical location.

There are no formal contractual relationships between the FPA, grower and buyer. It is an environment in which trust between these to parties plays a crucial role in allowing the product to flow to these markets.

The absence of formal contracts creates a highly volatile and competitive environment filled with the potential for opportunistic behavior. This dynamic environment is highly regulated by an established set of legislation and actions of the city councils. This proofs to be a critical component in the functioning of these markets. The structural assurance [12] this provides reduces risks and forms the catalyst for the parties to participate.

V. THE TRUST PROCESS

Users tend to place their trust in a combination of people, objects(products) and the environment. Trust in e-commerce is driven partly by trust in the seller, sellers product and partly by the electronic channel itself [11]. Trust within electronic exchanges need to be viewed as not just a trustor/trustee relationship, but that of a trustor also trusting the broader environment and technologies.

Trust plays a crucial role in allowing the process to flow avoiding costly verification and contractual requirements generally present in commercial relationships. If the level of trust were to be disturbed it would lead to typical symptoms of low trust environments namely:

- insistence on higher levels of regulations,
- contractual agreements
- increased oversight
- increase proof of delivery and verification of services

This result ultimately creates a higher cost environment. This fresh produce markets in South Africa were institutionalized over many years and because of the high level of resulting institutional trust, this has created a low cost marketing channel. Institution based trust refers to the structure's ability to offer assurances [12] to the individual.

Two key concepts are identified by [12] supporting *trust* forming *behaviors* namely structural assurance and situational normality.

Structural assurance refers to the presence of parallel structures like regulations and contracts. In initial relationships the role these safeguards play will be more important. As the relationship matures and knowledge of the other party increases the reliance on these assurances are reduced.

Situational normality refers to the perception that the individual (customer) has that everything is "normal". The perceived normality of the environment, seeing others transact through the same channel, plus comfort placed in the other party's role, positively contributes to trust.

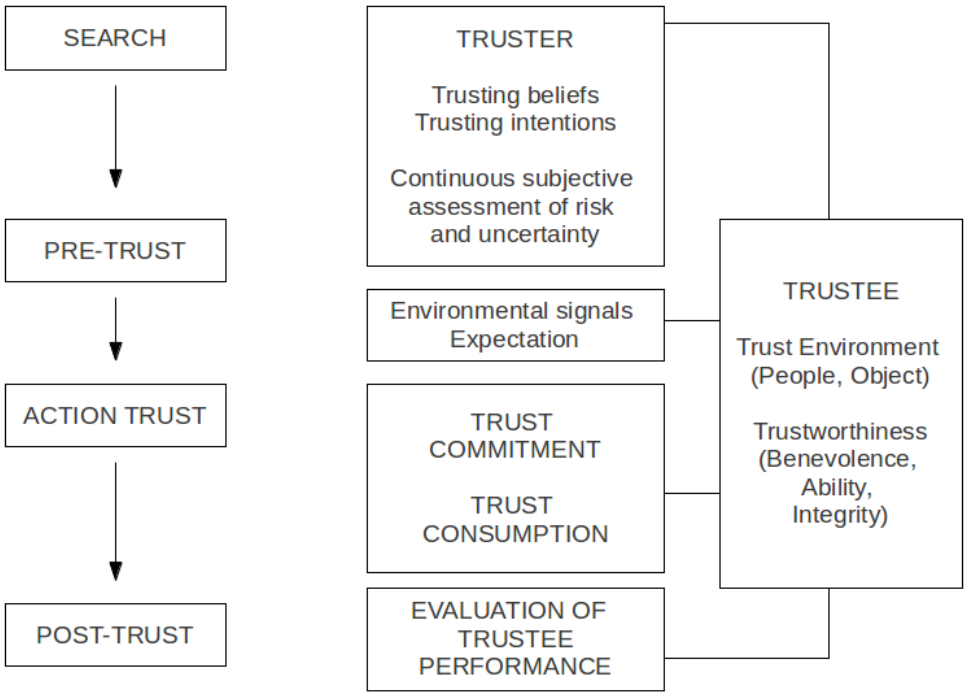

Fig. 2. Basic trust elements. Based on trust elements highlighted by [8],[11].

The challenge is to create these two trust forming elements as part of the electronic exchange. Firstly the trust process needs to be clarified.

Fig. 2 combines aspects of trust from various authors. The trustor, through its trusting beliefs and trusting intentions [12], evaluates the multiple signals (risk, uncertainty) from the environment and creates a risk profile. Elements like the trustee's ability, benevolence, integrity [8] is used to determine the trustworthiness of the trustee.

A decision is made to commit to the transaction based on an expected outcome (trust expectations). Not only is it the trustee (FPA) that is trusted but also the environment (market place) and object (systems) as discussed above.

Once the service is consumed a post-trust stage is entered where the actual outcome is evaluated against the expected outcome. If the trustor is satisfied with the outcome he/she might enter the pre-trust phase again to consume the service again. If on the other hand the trustor was not satisfied with the outcome a new search phase is entered.

For purposes of the framework the above process is broken down into four distinct phases in Fig. 3.

The stages depicted in Fig. 3 requires a different level of trust intensity from the various parties. It can be expected that the trust (and risk) levels increase as the transacting parties approach the decision phase (Action trust).

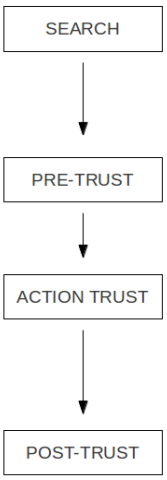

Fig. 3. Stages of trust engagement.

A. Search phase

The SEARCH phase is the stage where the customer (can be applied to both the grower and buyer) seeks a party to fulfill a specific service need. In this case these service needs differ between the two parties. Various contacts are made and an initial profile of potential service providers are identified.

B. Pre-Trust

A positive confirmation of the initial expectation yields a pre-trust commitment. Risks are calculated and

contextualized . Expectations are formed around the expected outcome and progress is made to the next stage.

Reference [12] highlights the initial trust paradox. One would expect the trust to be low within initial interactions where parties are unfamiliar with each other. That some potential benefit must first be perceived to be available before parties are willing to commit. It was found that trust does not start from a low base and then grows as the relationship matures. Maturity being influenced by accumulated knowledge and/or potential cost/benefit factors. Rather high levels of initial trust was observed [12] brought about by an individual's disposition to trust(willingness to trust others) institution based trust (believe that impersonal structures support the likelihood of success) and cognitive based trust.

Institution based trust relies heavily on supportive measures that offers recourse if so required. This refers to the legal/assurance structures available. All of these elements are present in any given transaction in varying degrees [12].

C. Action-trust

Trust is an action and requires a decision. The commitment from the party towards the system is displayed by engaging with the service accepting a level of vulnerability and entrusting the expectations to the FPA. This might take the form of paying monies, or committing to delivery times.

D. Post-Trust

Once the trust action is performed and the service delivered, an evaluation is made of the outcome. Outcomes are compared to pre-trust expectations. Decisions are made about engaging again or whether to return to the search phase. A negative experience needs to be “fixed”, if not the party's trust is reduced and a new search phase is entered to identify another party.

E. Differentiation of services

The differentiation between the two services provides two distinctly different approaches to consuming the service.

The FPA faces two scenarios. One from the grower side and one from the buyer side of the physical product. With the above as a basis both the service side as well as the selling side of the function is discussed. This service duality is a key element of the model and is discussed next.

F. Dual service

Fig. 4 provides the graphical representation of the dual service provision of a FPA. From both the grower and buyer side the different stages are followed until the selling function unlocks the services relevant to that party. After committing to the service a post-sales stage is reached where a final evaluation by both parties are made. A determination whether they want to engage with the service again is made. A positive conformation of initial expectations will lead to returning to a pre-trust state. A negative conformation will lead to the return to the search stage where a new service provider in the form of an alternative FPA will be contacted. Due to the required high trust nature of the business, relationships are formed over many years and is well established.

1. From the grower's perspective.

The following provides the service perspective from the grower's view point:

- SEARCH PHASE: Within the search phase the specific required sales service is sought. The grower typically as part of its marketing function seeks to find the best price across the various marketing channels. Information like general price fluctuations and expectations are evaluated.
- PRE-TRUST PHASE: Initial negotiations on the expected prices and information exchange is negotiated and commitment is given. The grower typically will verify information by triangulating facts with other sources. The maturity of this relationship will determine to what extent additional verification will be sought before committing again.
- TRUST-ACTION PHASE: Once the grower commits to deliver/supply produce a physical action is performed. This indicates acceptable perceived risk levels from the growers perspective..
- POST-TRUST: Evaluation of expected and actual prices achieved.

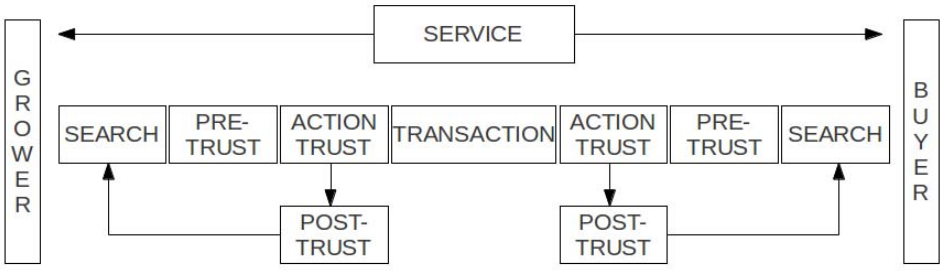

Fig. 4: FPA dual service. From both the Grower's and buyer's view point

2. From the buyer's view point

The following provides the service perspective from the buyer's view point:

- SEARCH PHASE: Searching to fulfill a requirement being the purchase of the produce.
- PRE_TRUST PHASE: Evaluation of prices and commitments relating to delivery and quality.
- TRUST_ACTION PHASE: Commitment as far as the purchasing of the product is concerned and ownership passes.
- POST_TRUST: Receiving of the product and the evaluation of the information supplied vs what transpired.

Having described the dual service facing the FPA the proposed model is presented.

VI. PROPOSED MODEL

The proposed model combines three aspects:

- The dual nature of the service as defined
- The stages of engagement
- Underlying role of people, process, technology and assurance/legal framework

As discussed in the previous sections, the correct definition of the service is crucial in providing the relevant SST. A casual definition would view the process as a selling process between the grower and the buyer ignoring the fact that there are two different parties with different requirements.

As soon as the parties start to make use of the services, the level of intensity increases. The level of information distribution, personalization of the service, communication and security for example takes on different forms as the trust intensity increases. To improve the trust levels in the SST these elements needs to be designed to accommodate each one of these stages (Fig. 5).

Underlying to the model (Fig. 5) is an emphasis on people, process, technology and assurance.

People participating in the SST should be registered. Knowledge of the process, how it works, levels of responsibility, roles etc. all reduce uncertainty. The technology supporting the SST obviously needs to provide a high level of availability. Adoption of the technology itself should be at a mature stage. Ownership of the technology platform should reside with a central authority. Furthermore, an objective third party that ensures information privacy and confidentiality is maintained, creates a perception that opportunistic behavior is less probable. A high level of assurance assists in reducing the perceived risks. To ensure trust, the SST needs to be very explicit about the assurance provided and corrective action available, especially in the case of service failure.

VII. CONCLUDING REMARKS

Trust is a highly contextual subject. The purpose of this study was to provide insight into the contextual dynamics of mapping various service processes into an electronic exchange retaining the multiple trust layers. The challenge posed to the model is how to approach the design of self-service electronic exchanges, accommodating the various trust dynamics present in the physical exchange.

As was shown in the fresh produce industry, the mere fact that a high trust environment is functioning in the physical realm does not mean that it can be ported to the electronic self-service domain. Specific focus should be placed on the

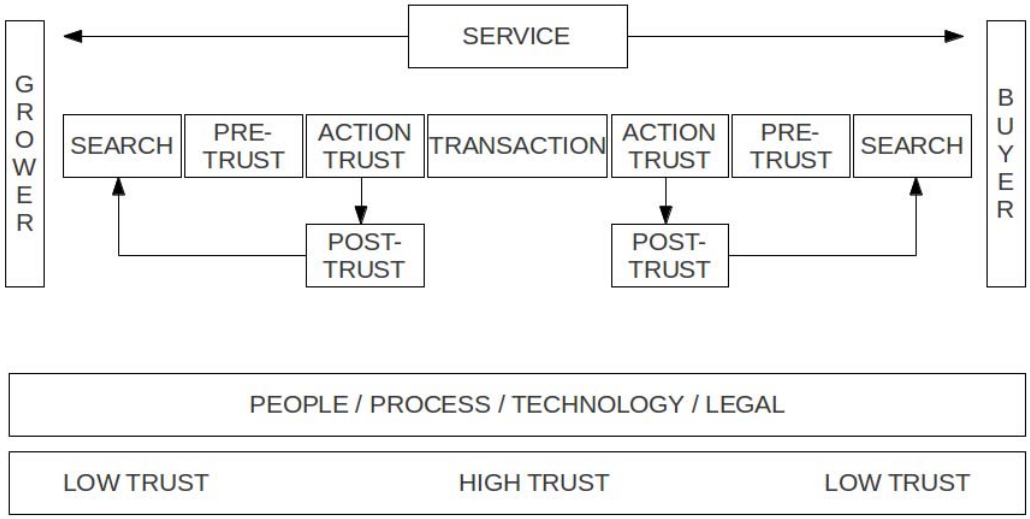

Fig. 5. Model for enhancing trust within SST.

different service and trust dynamics across the service chain. This requires specific and deliberate attempts to accommodate these in the design, implementation and maintenance of SST's. This paper contributes to our understanding of SST through the proposed model and highlights the following:

- The service environment needs to be clearly defined in order to define the needs of the customer using the service.
- The core and supplementary service needs to be identified for the provider of the SST and integration between these facilitated electronically.
- The people process, technology and legal/assurance structures need to contribute to the structural assurance the exchange provides.
- Provision needs to be made for the various levels of trust engagement. From the search stage to the post-trust stage. Each requires a different set of trust dynamics that needs to compliment the service.

It is the entire trust eco-system that needs to be functional in order to create a trusting self-service solution. No component can be excluded. Generalization of the various trust supporting aspects of a SST cannot be made due to the unique nature of a service environment. To approach the problem of trust within SST implementation in this manner will lead to failure to appreciate the subtle but important trust dynamics.

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