Servitization: An Integrated Strategic and Operational Systems Framework

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***Abstract*--The global marketplace is increasingly characterised as being both turbulent and extremely competitive in nature. It is within this context that the servitization strategy assumes relevance in positioning traditional manufacturing institutions to gain a strategic advantage and enhance their revenue streams. Based on a multi-disciplinary literature review a strategic and operational systems framework was developed and used as a source of reference in analysing a servitization strategy implemented at a South African manufacturing institution. The framework in effect served as a means to gain an understanding of the integration and interaction relationship that exists between the various systems concerned. An important finding emanating from the research study was that the institution's business model itself needed to be significantly adapted in order to implement the servitization strategy. This in turn engendered the need for an integrated systems perspective of the change management process adopted. In summary, the research findings and the systems framework developed form the focus of this paper and it is suggested that it could serve as a source of information and reference for management practitioners, engineers, and technologists involved in managing similar servitization strategies.**

I. INTRODUCTION

> *"A customer service-oriented strategy can be viewed as reflecting a decision to emphasize customer responsiveness as a strategic priority, rather than standardization*".
>
> Bowen, Siehl and Schneider [2]

The introductory quotation assumes a client-centric orientation in strategy formulation, but even more pertinently expresses a need for a sense of "emergent" responsiveness, as opposed to a recipe-based standardised process. In this sense "flexibility" assumes pertinence. The "Art of War" was authored well over two thousand years ago by Sun Tzu, a Chinese warrior and philosopher [4]. Notably, Sun Tzu also metaphorically placed an emphasis on strategic adaptation and unorthodoxy, as may be seen from the ensuing extract [4]: "*Those skilled at the unorthodox are infinite as heaven and earth, inexhaustible as the great rivers. They come to an end, they begin again, like the days and months; they die and are reborn, like the four seasons*". Implied are great rivers of ceaseless flux and change, which within a prevailing context of inherent instability and extensive competiveness would seem to suggest a need for an innovative strategy of incessant renewal and adaptation to changing service marketplace contextual conditions. It is a metaphor that has resonance with Vargo, Maglio and Akaka's [29] conceptualisation of innovative "*value-creation configurations of service systems*". They are deemed to be a hardly static, but dynamic value creation configuration that "*depends on interdisciplinary knowledge and skills, integrating across technology, business, social, and demand innovations*" [29]. At the very core of service driven strategy, it would seem, is therefore a dynamic and innovative integrated value-configuration of services enabling support systems.

The relevance of this research paper may be determined from the contention by Visnjic, Neely and Wiengarten [30] that "while manufacturing firms continue to embrace servitization in growing numbers, the literature remains undecided on the characteristics of a successful service strategy … as well as organizational implementation". With this in mind the focus of the research study, on which this paper is based, has its origins in the need for gaining an understanding the concept "servitization" from a multi-disciplinary strategic perspective of innovative systemic value-configuration integration, as briefly alluded to in the preceding discussion. The research gave rise to the development of a generic services management framework that not only reflects the servitization conceptual integration of manufacturing and services value-configuration systems, but also the underpinning multi-disciplinary support systems. A multi-disciplinary, contemporary literature review formed the basis for the development of the services management framework. A case study was conducted to assertion if the model had relevance in practice. As such the research study constituted a narrative enquiry, so as to learn from the executives, managers and staff experiences in implementing a servitization strategy at a South African Manufacturing institution. A key finding from the research study being the existence of a close correlation between the framework and its application in practice. The framework has subsequently been successfully adapted and used the gain an understanding of the role of e-health systems in healthcare service delivery, but due to constraints of time and space this will fall outside of the scope of this paper.

In the ensuing discussion the concept "servitization" and the integration of manufacturing and support systems will be briefly dealt with. The development of the services management framework will then be discussed with reference to the interaction and support systems underpinning the servitization process. With the framework serving as a source of reference the case study will then be analysed to gain an understanding of its relevance in practice.

II. LITERATURE REVIEW

A. "Servitization": A concept and systems perspective

> *"Modern corporations are increasingly offering fuller market packages or "bundles" of customer-focussed*

> *combinations of goods, services, support, self-service, and knowledge. But services are beginning to dominate. This movement is termed the "servitization of business"*
>
> Vandermerwe and Rada [27]

The introductory extract from a paper entitled "*Servitization of business: Adding value by adding services*", by Vandermerwe and Rada [26], serves as the origins of the concept "servitization". It is almost certain that at the time they were hardly aware that they that they had in fact coined a term and concept that would gain significant relevance in an era where services have come to dominate the global economy. Fitzsimmons, Fitzsimmons and Bordoloi [8] in fact claim that the world is witnessing the greatest labour migration, from agriculture and manufacturing to services, since the industrial revolution. They suggest that the migration to services in effect characterise the nature of most national economies of industrialised nations [8]. Notably, Desmet, Van Dierdonck, Van Looy and Gemmel [5] also attest to the fact that increasingly manufacturing institutions are offering an integrated package of products and services to clients and this, according to the authors, necessitates a need for a new mindset and ways of doing things. The traditional view is one of services, such as installation, repairs, maintenance and after-sales services, as an add-on to the product, while the more contemporary view is one of providing clients with integrated business solution [5].

Shen and Wang's [26] research reveals alternative terms that in concept are very similar in nature to that of "servitization", some of these being "*product-service systems (PSS)*", "servicizing" and "*service/product engineering*". These terms tread very similar ground to the concept of "servitization", according to Haasbroek [12], with differences ranging from subtle to clearly-emphasised. Citing Boyle, White, Stoughton and Feng, it is claimed by Haasbroek [12] that "servicizing" is generally defined as the dynamic process in which a manufacturing firm moves towards a more service-orientated business model. Citing, Hara, Arai, Shimomura and Sakao, Haasbroek [12] defines "*Service/product engineering*" as the engineering principal where products and services are engineered in parallel towards total value creation. The important aspect that emanates from the preceding discourse is that the concept "servitization" has assumed an array of different terminological connotations which in effect conceptually are very similar in nature.

Following a similar trend of thought, Visnjic et al. [30] claim that "servitization implies the innovation of an organisation's capabilities and processes so that it can better create mutual value through a shift from selling product to selling product–service systems". Here again the accent is on an integration of product and service systems or as suggested by Desmet et al. [5] the notion of "a bundle producing company" where the focus is on the client and the realisation of their services related needs. Implied therefore, according to Rajala, Westerlund, Murtonen and Starck [24], is the need for a better understanding of the new "service-business logic" and the formation of "customer value". Quite pertinently Rajala et al. [24] theorise that a services-logic requires new approaches, skills and mindsets, as clients for instance become co-producers of the services that are simultaneously generated and consumed. Seen within this context Grönroos and Revald's [11] contention that each instance of value creation is unique and can only be assessed from the perspective of an individual service system assumes significance. In a similar vein it is argued by Rajala et al. [24] value from a client perspective emerges from a spectrum of client and service provider interactions, which collectively shape the client's service experience.

The client's service experience, it could be argued, needs to be seen in relation to their service expectation. If the service value-creation experience exceeds the client's initial expectation it could be deemed to be favourable. The convers also appears to be true and it could be concluded that two key factors, namely client expectation and the value-creation experience itself in effect define the quality of the services rendered. This in turn will undoubtedly impact on the client's view of the institution's products. The service interactive value-creation or value-in-use experience, it is seen, are subjectively judged by the client [11]. Within a product-centric perspective, the possibilities of manufacturers to interact with the client are undoubtedly limited [11]. From a marketing perspective servitization, through the service value-creation process and the interaction that takes place with clients, therefore offers significant possibilities, which brings into contention the issue of relationship management. The establishment and management of relationships with clients in effect represent a need for a paradigm shift [22] that needs to be actively managed as part of the servitization process. It is stressed by Palmer [22] that the often encountered failure of customer relationship management (CRM) systems in practice, reflective the reality that such systems constitute far more than a technology solution, it entails "an entire change in mindset" and a shift "from CRM to customer experience management".

The concept "servitization" or the move from a product-centric manufacturing to an integrated product – service system, quite clearly necessitates taking cognition of technology and human systemic considerations. In this regard the European Commission [7] for instance define service economic actives as a combination of technology, knowledge and highly skilled employees to provide a service to the market. With this in mind it is important to note that knowledge intensive services are seen by the European Commission [7] as constituting a catalyst for innovation driven rejuvenation of industrial manufacturing sectors. In exploring the concept "technology", Burgelman, Christensen and Wheelwright [3] in a similarly sense construe that it refers to the "*theoretical and practical knowledge, skills, and artefacts that can be used to develop products and services as well as their production and delivery systems*". The

description quite evidently integrates human and technological system considerations as support elements in effective service delivery.

Pretorius [23] is another researcher who also brings the human aspect into consideration in defining technology as: *"the integration of people, knowledge, tools and systems with the objective to improve peoples lives*". In discussing the movement from a product transactional-based, to a services relationship-based business model Baines [1] specifically accentuates that "people, technologies and business processes all change" when a manufacturer sets out to compete by adding services to its value offerings made available to clients.

The golden thread winding its way through the preceding discussion is the realisation that human, technology and business systems interactively need to support the implementation of the servitisation strategy. The important aspect to take note of, however, is that the specific contexts acts as a determinant in defining the nature of the technological systems, skills and knowledge required. Of further relevance is the fact that that depending on the context concerned further support systems can be identified. The introduction of a National Health Insurance (NHI) initiative in South Africa, for instance, brings socio-political, legal, financial, and healthcare business related support systems into sharp focus [32]. In this regard it may be noted that servitization in a healthcare context is depicted in terms of an integration of two primary value chains, namely products (medication and physical devices) and healthcare services (primary healthcare, disease diagnoses, therapy, treatment, and rehabilitation) [32]. Notably, technology within this context is seen as constituting a wide spectrum of e-health related technologies.

B. A generic servitization systems framework

> *"A product-service system is a system of products, services, supporting networks and infrastructure that is designed to be: competitive, satisfy customer needs and having lower environmental impact than traditional business models".*
>
> Mont, cited by Henze, Mulder and Stappers [14]

The introductory extract brings to the fore a number of important aspects that need to be taken into consideration in the design of a generic servitization systems framework or model. One such aspect is the focus on client needs. Clients may have clearly defined needs and expectations, both in relation to the product that they require, but also in terms of the nature of the services that they will need to gain maximum value from the product utilization. In essence the accent is on value and value co-creation that necessitates a systems-based approach in the configuration of the systems concerned [29]. In this sense the supporting systems infrastructure, as reflected in the introductory extract, also assumes pertinence. Collectively the value addition afforded the client through a heterogeneous network of interacting systems cannot be at cost of the environment, that would seem to be inherently implied in the introductory quotation as well. Citing Aristotle, Vargo et al. [29] draw a distinction between "exchange value" and "use-value" the former being product-centric and the latter more service-centric. They inherently reflect different ways of thinking about value and value creation from a systemic perspective [29]. A services-dominant logic implies the need for an interdependent framework of multi-disciplinary systems directed at supporting a co-creation of value for the client [29]. In contrast to service orientated logic of co-creation, the goods-dominant logic is vested in value-of-exchange that tends to draws a distinction between manufacturer and consumer [29]. This subtle distinction embodies system nuances that need to be factored into the servitization model.

A network of interrelated and interacting systems is context related and subject to shocks and disturbances encountered within the particular context concerned [31]. The ability and capacity of the integrated network of systems to absorb the disturbance and still retain its basic function and structure, it is argued by Walker and Salt [31], implies the need for a sense of resiliency. The ruling paradigm of optimizing components of a system in isolation of the rest of the system is seen as proving to be inadequate and having a diminishing effect on the resiliency of the entire system [30]. A holistic systemic approach is therefore suggested as needing to be adopted in compiling a resilient servitization framework, the resiliency element being embodied in the underpinning cultural and systemic elements of the framework. By understanding how and why the system as an entity is changing within a broader contextual dispensation, management is better positioned to engender a capacity to adapt and respond to changing contextual conditions [30].

At the very core of the servitization framework is the value proposition or bundle of products and services made available to clients. Osterwalder [21] in the development of a business model places the value proposition at the centre of his model with capability and target client networks linking thereto. The capability infrastructure brings two additional systemic components into consideration, namely partnerships and value configuration [21]. It is suggested by Heinze et al. [14] that the more traditional manufacturing model is that of a single manufacturer or provider and a heterogeneous network of clients. The more contemporary emerging model, however according to Heinze et al. [14], is that of a network of clients tied to a provider with a support network. In effect the delivery capacity therefore emanates from an integrated enabling network of institutions or entities providing product and services components within a larger systems framework. This description correlates with the preceding introductory quotation of product service systems. The challenges, according to Heinze et al. [14], are gaining an understanding of the entities involves as a heterogeneous network rather than a set of isolated individuals.

At the other end of the value proposition, as depicted by Osterwalder [21], the focus is on the target client and the client's needs and expectations. Two key system elements emerge here, namely relationship management and channels of product distribution and services rendering. The researcher contends that information and communication technology, as a support system, plays a very fundamental innovative role in opening new opportunities for establishing relationships and channels though which products and service delivery can be enabled and facilitated [21]. Hoogenhout [13] similarly accentuates the need for relationship-based skills in implementing a servitization strategy but found that in practice such skills were often lacking. The financial aspects relating to the business model are not lost sight of either and the costs incurred through the servitization process, as well as revenue generated through the new income streams need to produce a profit at the end of the day to be sustainable [21]. The financial systems in effect form a distinct component of the servitization framework.

Van Looy, Grommen, Grielens, Schillewaert and Matthÿnssens [28] in exploring the linkage between information and communication technology (ICT) systems and services delivery conclude that services are processes that "are rich in information exchange" and are consequently affected by developments related to information technology. The researchers claim that information technology accounts for more than 80% of the technology purchased by service sector firms and constitute the predominant focus of service sector technology research and development [28]. It is further accentuated by Van Looy et al. [28] that it is not implied that other technologies do not also assume relevance, as technology for instance forms a vital support element in the healthcare industry from a diagnoses and treatment perspective. It is in fact quite difficult to envisioning service delivery without an appropriate technology support infrastructure. Gatwero [9] in researching health information needs of medical professionals concludes that many critical information needs were not being adequately met in practice. Socio-political structures are also cited by the researchers as forming part of the heterogeneous network constituting healthcare information systems [9]. Seen in the context of the South African government's National Health Insurance initiative, socio-political systems assume a very pertinent inhibiting or supporting role. It may therefore be concluded that technology and socio-political systems need to be factored into the product, services framework as support systems to be taken into consideration.

From the preceding discussion a number of systems that assume pertinence within a servitization framework can be identified. The product and services value chain form the first two fundamental systems that collectively form the core of the servitization framework. They are instrumental in the development and delivery of the client-centric value configuration. Client customisation of the value configuration implies the need for well-established relationship management systems, as a one-size-fits-all approach may no longer be appropriate within a highly completive marketplace. The client from a services perspective is also deemed to form part of the co-creation "value-in-use" process, which in turn implies that they conceptually play a role in the design and implementation of the value streams. This in itself, from a servitization perspective, entails a fundamental paradigm change in traditional manufacturing management thinking and practice. It also raises the issue of the human aspects involved, such as skills, knowledge, and expertise required for integrating a services value stream into the servitization framework.

Hoogenhout [13] in researching the formulation and implementation of a servitization strategy came to a similar conclusion, namely that a T-shaped skills profile was required in practice, yet more often than not such profiles were not readily available. T-shaped people are described as having an in-depth understanding of their professional discipline (vertical component of the "T"), while reflecting a wide range of experience and understanding of disciplines associated with service science (horizontal component of the "T") [13]. The researcher's [13] findings also suggest that organizational culture has a fundamental role to play in the servitization process. Within the context of this paper these human or people related aspects are addressed within the human or socio-cultural systems component of the servitization framework.

Most manufacturing institutions will have established a well-articulated product value chain and the accent in implementing a servitization strategy will thus be on the development of the services value chain. As a point of departure Gemmel [10] suggests that "service process designers should consider how to bring customer needs into the process, how to map the customer activity chain and the provision process, and how to deal with some specific challenges in process management". Kim, Lee, Jeong, Kim, Kim, Noh and Won [15] suggest that a service design process is composed of for major phases, namely value-modelling, service activity design, service touch-point design and experience management. It would appear that a correlation exists between the approaches suggested by Gemmel [10] and Kim et al. [15]. These researchers clearly bring the client and the value to be derived by the client from the co-production of the services into consideration.

The "value" orientation surfaces, as an important consideration within the literature, as may be determined from the preceding discussion and this reality needs to be articulated in the development of the servitization framework. The servitization framework depicted in figure 1 reflects such an approach. The framework depicts on the one hand "client value expectations", while on the other hand it manifests the "client's actual experience" in this regard. If the client's perceived value derived from the experience exceeds his/her initial expectations the quality of the delivery process may be deemed to have been positive. The converse, however, also assumes relevance in engendering a negative outcome.

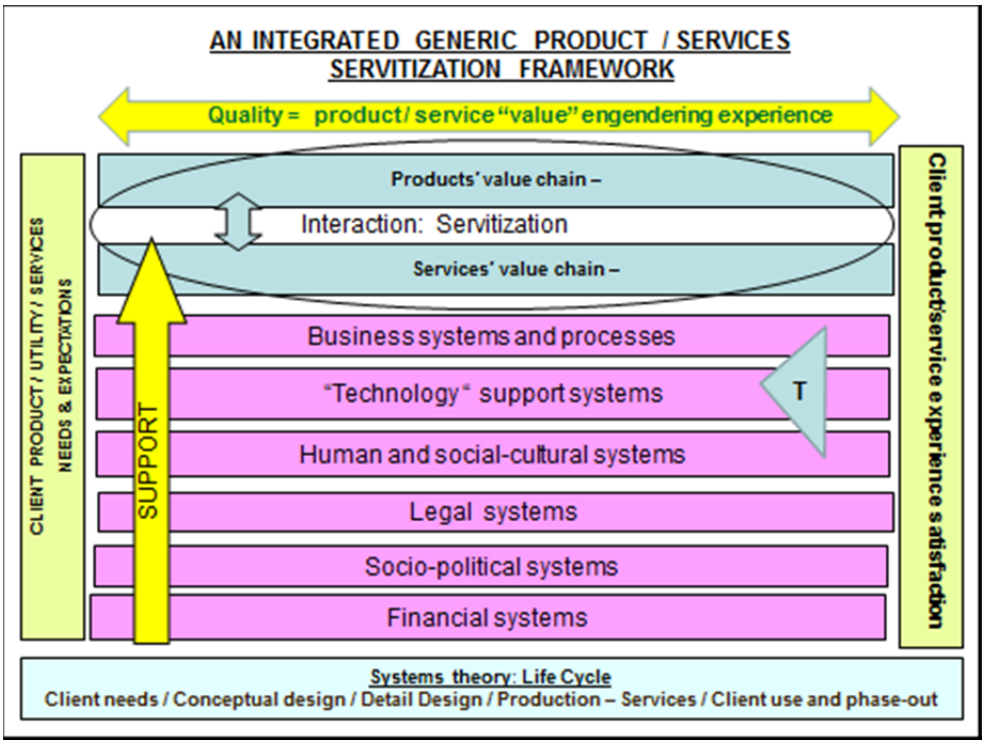

Figure 1: Servitization: A systems framework [33].

The framework presented in figure 1 assumes and reflects the definition attributed to technology by Pretorius [23] in terms of a triangular interconnected and interacting network of business, technology and human related systems, as previously alluded to in the preceding discussion. From the brief literature review it would seem that the support systems and their interaction play a crucial role in the servitization process. It needs to be noted that a "systems" perspective was intentionally adopted in the development of the framework and in conducting the case study an objective was to determine if the systems reflected in the framework have validity in practice.

In the ensuing section the relevance of the framework will be analysed on the basis of a servitization case study undertaken by the Graduate School of Technology Management (GSTM) at a security access system manufacturer in South Africa.

III. METHODOLOGY

The research study constitutes a multi-disciplinary literature review and a narrative enquiry-based case study. The research study was essentially analytically, interpretive and descriptive in nature. The systems identified in the literature, as underpinning the servitization process, are reflected in an integrated generic framework. The case study is turn is directed at determining the relevance of the framework in practice.

The intent in using narratives to conduct the research, can be best described by means of Lawlor and Mattingly's [17] conceptual paper. They suggest that "*rich narrative depictions are much more useful than abstract generalizations or belief statements*", and that personal descriptions, can often provide the interviewer with an ''inside perspective'' of what had taken place. [17]. Riley and Hawe [25] would seem to concurs with this contention in claiming that "narrative inquiry captures how people make sense" of their life world situation. Citing Kerby, Kramp [16] expresses a similar conclusion in stating that "narratives are a primary embodiment of our understanding of the world, of experience". Within the research study this was precisely the objective, namely to learn from the hands-on experience of the respondents, the context thereof being the implementation of a servitization strategy in practice.

The case study was undertaken by the authors (Senior Researchers) and three students from the GSTM. Each student dealt with a specific theme or aspect of the research study. It in essence constituted a literature review and a narrative enquiry directed at gaining an insight into the servitization process from a theoretical and practice perspective.

The owners and executive management team of an institution, who had recently implemented a servitization strategy, were interviewed to learn from their first-hand experience, challenges encountered and knowledge gained in moving from a purely manufacturing institution to one

providing clients with a bundle of products and services. The research study was therefore essentially an insight study and as stated analytically descriptive in nature, thus best being termed to be a qualitative research study. The findings emanating from the case study were analysed in terms of the systems framework depicted in figure 1 in order to determine if evidence exists for the framework's validity in practice.

Due to the sensitive nature of the information collected it was conducted on a basis of anonymity and neither the name of the enterprise nor the names of the respondents are divulged.

IV. SERVITIZATION: CASE STUDY

A. Servitization: Core value creation and support systems

The owners of the institution as a point of departure, in the narrative enquiry interviews, indicated that from a very early stage in the enterprise's existence a key problem encountered was the distribution and installation of the systems that had been manufactured. The primary focus of the enterprise from the very beginning had been on the design and manufacture of high quality electronic access systems. It soon, however, became apparent that the manufacture of such access systems would only add value to clients if they could be readily acquired, installed and maintained. The owners therefore arranged to have the products marketed through a network of security systems distributors. This necessitated a host of new business and electronic systems to be implemented to deal with the product distribution, invoicing and related aspects involved. It in effect necessitated a change in the institution's business model and value co-creation with the distributors in bringing the manufactured products to the market. It did not however solve the problem of installation, maintenance and repairs of the products sold by the distributors. The owners indicated that as engineers their vision was one of focusing on state of the art, high quality access system design and manufacture. They therefore needed to get a network of small independent installation and maintenance service providers in place, who would be able to provide the required services to end-user clients. This, according to both owners, turned out to be quite difficult as the service providers needed to be trained in the marketing, installation and repair of the enterprise's specific range of products.

It was found by the management team that the best means of getting this done was to establish a training facility at the factory. Seen in the context of servitization systems framework the human skills and knowledge factor entered into the picture as the services providers needed to acquire an insight into the application of the manufactured products from an installation and client-use perspective, the accent being on the total value to be derived in acquiring, installation and use of the electronic access systems by the client. Many of the managers interviewed indicated that this in general entailed a paradigmatic change from focusing on technology aspects to bringing the end-user cent and the distributors and service provider intermediaries involved into the bigger picture.

Hoogenhout [13] similarly acknowledge that "a distinct difference exists between the types of skills required by a manufacturing-based organisation, in relation to what a service based organisation requires". The former, in terms of business systems focuses on production and enhanced efficiency, while the latter focuses on establishing profitable relationships with clients. A few of the managers interviewed noted that the traditional manufacturing paradigm was one of efficiency and quality enhancement. With the establishment of the services related activities a new element of relationship management was engender, one that needed to be factored into the training course for service providers. Installer training, it was mentioned by managers interviewed, was not directed at being a revenue generation activity by the organisation, but one of establishing a capacity to meet client end-user services needs and expectations. The respondents mentioned that the manufacturing and services related facilities within the organisation needed to be physically separated. Apparently the business systems and processes, particularly as it related to repairs, needed to be dealt with on their own in order to not impact on manufacturing production lines. The culture supporting each of the production and services value chains also differed significantly and according to the respondents interviewed this necessitated a physical separation of the two value streams. Quite significantly, Oliva and Kallenberg [20] based on their research findings similarly conclude that one of the initial steps in managing the servitization process is the need to consolidate the services related activities within a single operational unit.

A marketing and sales business unit, it was noted by the respondents, needed to also be established with appropriate business and ICT support infrastructure. The previously alluded to training of installers also featured within the services business unit's operational activities and required appropriate client orientated support infrastructure to be established. Common to both the manufacturing and services business operational units was a need for a sharing of information across the relative operational boundaries. A case in point cited by one of the management respondents was the need to keep the manufacturing division informed as to the nature of trends encountered in repairs, as well as design considerations that could enhance ability to effectively repair of units brought in by both installers and clients. Although physically separated the units concerned made use of a common information exchange support infrastructure. Feedback from installers received during training was also passed on to the design staff within the manufacturing section. The need for a common and interconnected flow of information it was suggested by respondents enhanced the quality of the product design, as aspects that facilitated installation, maintenance and repairs, as suggested by installers, could be taken into consideration.

Morris and Jamieson [19] are of the view that as strategy flows through an organisation, it crosses a number of functional boundaries or disciplines. The executives interviewed claimed that at a strategic level the vision and objectives formulated for the enterprise as an entity assumed relevance. The strategy specifically was client-centred as the focus was on providing clients with a complete solution that would meet their access security needs. It is stressed by Morris and Jamieson [19] that corporate strategy serves as a means of considering and articulating how an organisation's corporate goals and objectives are pursued and achieved. The executive team members interviewed would seem to concur with this contention in claiming that at a strategy level the quality of the product design and manufacture, as well as the services rendered to a diverse client base of distributors, installers and end-users was a key objective of the organisation. Quality and value co-creation surfaced as a key determinant of the institution's strategy. It is reflected at an operational level by the training provided for both distributors and installers to ensure that all the people involved in the value co-creation process have the necessary skills, knowledge and expertise, in relation to the products and services provided to end-users.

An important finding in terms of the research study, as described by Du Plessis [6], is that the picture that emerges from the narrative enquiry would suggest that the servitization strategy essentially unfolded over the pace of time in response to contextual conditions and situations that had emerged and that were either unforeseen or unexpected. The executive management group's narrative account of the servitization strategy and the related business process that evolved in response to contextual issues that arose over the course of time, give support to Mintzberg's [18] observation that, while institutions often pursue what may be called umbrella strategies, the actual details are allowed to emerge within them. As noted by Du Plessis [6] this would seem to contradict the theory of having well formulated long term strategic plans in place to direct the servitization process. It also gives credence to Mintzberg's [18] observation that *"the real world inevitably involves some thinking ahead of the time as well as some adaptation en route*". The respondents description of the servitization process is therefore one of incremental adaption and implementation of service systems and appropriate support system infrastructure. So for instance the need for training of distributors and installers, in terms of the institutions range of products, only became evident when difficulty was encountered from marketing and meeting of clients' needs for specific services became more apparent.

It may be conclude from insights gained from the respondents interviewed that while an inherent distinction exists between the operational activities within the services and manufacturing units, a sense of integration also exits when it comes to strategy, information exchange and communication across operational boundaries. This reality is accommodated in the servitization framework, reflected in figure 1, as the respective support systems underpin both the manufacturing and the services value chain activities.

B. Servitization: The human and socio-cultural systems

Based on interviews conducted with the respondents, Du Plessis [6] found that as the servitization process unfolded, it became apparent that the traditional value system that had evolved within the institution needed to change to accommodate a client centric approach as opposed to one merely supporting excellence in the design and manufacture of the products manufactured by the institution. The two differing cultural orientations and the need for both, it is suggested by Du Plessis [6] "is reflected in the owners decision to split the two functions of manufacturing and services into two separate entities, each with a cultural identity that would be more conducive to their operational settings". The company's endeavour to engender a services and client centric value system, according to Du Plessis [6], is also captured in the accent placed on services orientated or client relationship aspects encapsulated within the training programs. The executive management respondents pointed out they realise that, if the company wanted to deliver and to be successful in business, it is important to ensure that all employees are properly trained and focused on values [6].

Interviews conducted by Hoogenhout [13] revealed that the executive team had drawn attention to the fact that the client liaison typically entailed the expertise of technical staff, due to the technical nature of the product and the type of questioned frequently asked by distributors, installers and end-users. By implication the emergent values, beliefs, and norms that emerged had an underlying technology basis, but one that assumed value creation orientation. So for instance the design engineers claimed that they needed to take into considerations comments by installers regarding design considerations for ease of installation and maintenance. The marketing department's management indicated that initially they had difficulty in convincing the research and development team to include product features that would enable them to sell more units, but as a more client or end-user value approach became the norm this changed over a period of time [13].

The trend that appears to emerge from the narrative enquiry conducted by Du Plessis [6] and Hoogenhout [13 is one of an emergent culture as the servitization process unfolded. The culture that emerged was in effect one that supported both a manufacturing and a client-centric services operation directed at a co-creation of value. The accent place on quality products and services by the owners, were reflected in the interactions and conversations that took place between manufacturing and services orientated staff, as well as that with distributors and installers, resulting in a client-centric, value driven culture permeating such interactions. At an initial stage when the company was still relatively small the founders values and beliefs were easily shared with a growing staff compliment. As the number of staff grew in number and the interaction with distributors and installers

become more extensive it has become more difficult to entrench the "quality" related values that the founders were not prepared to relinquish. It is here were training of internal, distributor and installer staff has become imperative. Not only is the focus on skills and knowledge transfer, but on the quality related values and beliefs that the company stands for.

V. CONCLUSION

The supporting evidence that emerges from the case study would seem to suggest that the servitization framework and the systems identified as supporting the interaction that takes place between product and the services value chain activities has relevance in practice. The generic framework has also been adapted and found to have relevance in the design and implementation of e-heath support system in a healthcare services context [33]. It is therefore suggested that the framework could serve as a source of reference and information in implementing a servitization strategy.

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