

Exploring the deployment and skills of people critical to the delivery of advanced services

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1 Introduction

The evolution of manufacturing industry has seen significant changes in the organisation and expected skill-sets of workers. During the industrial revolution of the 1700s, for example, the introduction of the assembly line meant that relatively unskilled men and women (who were trained to carry out small repetitive tasks) could significantly increase their output over artisans in the conventional craft based systems. Ford (1922) is well known for using such systems to revolutionise automotive manufacture. Today, the process of servitization (where manufacturers seek to build their revenues through service provision) is similarly enabled by workers who are organised and skilled in a particular way. This paper explores this topic.

The research reported in this paper is part of a macro-programme to investigate the practices and technologies that successfully servitized manufacturers are employing within their operations. Extended and in-depth case studies have been executed across a range of organisations including Caterpillar, Xerox, MAN and Alstom. A variety of topics have been explored including facilities (Baines et al., 2012), information and communication technologies (Lightfoot et al., 2011), vertical integration and supplier relationships (Baines et al., 2011), performance measurement systems, and business processes.

As each set of findings have emerged they have been readily shared with the broader research community. In this particular “research note” deals specifically with those aspects of our macro-study that have investigated how people are deployed and their associated skill-sets. Here, our intention is to contribute findings that provoke debate around people and their organisation within successfully servitized manufacturers.

2 Context and questions

Servitization is the process of transforming manufacturers to compete through product-service systems (PSSs) rather than products alone (Baines et al., 2007, 2009a, 2010). The commercial and environmental benefits of PSSs are compelling and well documented (Rolls-Royce earning over 50 per cent of their revenue from services is cited to exhaustion). The opportunities are immense (three quarters of wealth world-wide is now created through carrying out services) and so politically PSSs are seen as key to industrial success in the twenty-first century.

A manufacturer's services can be thought of as either base, intermediate or advanced. This categorisation reflects the organisational stretch beyond production competences that are necessary for their delivery. Table I summarises the characteristics associated and examples of each type. Here, advanced services (the topic of this paper) are where the focus is on the assurance of performance provided by a product.

Advanced services extend the manufacturers operations into those of the customer for a lengthy term (five, ten, 15 years are typical). This change in organisational positioning and responsibilities means that there are now many more points of contact with the customer than would occur in conventional manufacture (Baines et al., 2009b). This places particular demands on the people who work within the manufacturer to deliver these advanced services, and success is pivotal on the way in which these people behave.

Only a few researchers have however studied the types and behaviours of people in service versus production organisations. A notable exception is Levitt (1983) argues that people in manufacturing think technocratically and by contrast people in service tend to be more humanistic. The particular topic of servitization is considered even less. Exceptions include Brax (2005) who notes that credibility with customers is fundamental, and similarly,

Vandermerwe and Rada (1989) who stress the importance of identification with the individual customers. Yet, the question remains unanswered; what is the behaviour we should expect of people engaged in the delivery of advanced services?

We know that behaviour is affected by many factors. Lewin (1935, 1951) was one of the earliest researchers to identify that behaviour is a function of the person and the environment in which they find themselves. This environment is both physical (such as heat, light, noise, vibration) and social (such as leadership, team working, communication, motivation and reward structures). The person themselves can be defined through their physical condition (age, gender, strength, dexterity) and psychological attributes (such as personality, attitudes, beliefs, emotions). This wide range of factors starts to explain what moderates the behaviour of people in services.

There is a wealth of literature in the social sciences that looks in depth at person-environment interactions (Kristof-Brown et al., 2005). However, this narrows considerably when looking specifically at services. Studies of people and their behaviour in the service industry have only emerged in recent years. Various topics have been considered, such as; the physical environment and perceptions of corporate image (Nguyen and Leblanc, 2002), self-managing service teams (De Jong et al., 2008), personnel management systems (Lewis and Entwhistle, 1990). Yet, the question remains unanswered as to; the appropriate environment/organisation that is need to support people engaged in the delivery of advanced services?

This whole topic is, though, complicated when taking a change management perspective. In other words, asking which factors can be modified to positively affect the behaviour of services people? Skill-sets are key; they both underpin the behaviour of people and can be readily assessed and developed in practice. The caveat being that some people have an aptitude for particular skills, and so are more easily developed, while others have an aversion and so are limited in the role they can take in an organisation.

3 Research design and execution

In this paper we deal specifically with those people engaged in the delivery of advanced services, their behaviours, and particularly how this is fostered through their organisation and skill-sets. As mentioned above this has been a strand of a macro-study, and at the onset we posed four specific questions, namely:

RQ1. What is the behaviour of people who are successful in the delivery of advanced services?

RQ2. How are these people organised and deployed to deliver advanced services?

RQ3. What skills are expected of these people delivering advanced services?

RQ4. How does this organisation and skills impact the successful delivery of advanced services?

The case studies were then designed and executed conventionally (Voss et al., 2002). The research questions were translated into a data-collection protocol that sought to capture, for each case, how people were organised and their associated skill-sets. As this a relatively unexplored aspect of servitization, our process was largely inductive. This data collection protocol was then piloted and refined through the help of a large aircraft manufacturer in North America.

The data collection process was then executed at four cases. A range of personnel were interviewed in each company, ranging from field engineers, maintenance technicians, through to senior executives with responsibilities for services. Complementary interviews were also conducted with a small but representative set of customers. Most interviews were conducted with two researchers, notes were taken, and conversations were recorded and transcribed. The resulting data was then collated. Cross case analysis was then conducted with synthesis being aided by mind-mapping techniques, and this led to common themes being established as responses to the principal research questions. Those responses are now summarised in the following sections.

4 Behaviours and skill-sets of people delivering advanced services

Across our cases we sought to identify that behaviour that each organisation values highly amongst people that deliver advanced services. Here, we were mindful that these would vary for workers in differing roles (front-line versus support staff), that there are basic hygiene skills that are required of all workers (e.g. an ability to work safely), and that only a few staff across all cases would fulfil all these expectations.

Analysis and synthesis of our case data using mind-mapping techniques led us to identify six principal behaviours that collectively led to a positive customer experience. We show these in Table II as desired behaviours. This is consistent with Levitt (1983) who suggested that people in service tend to be humanistic. By contrast, people in production might think (or be encouraged to think) technocratically, being technically excellent, analytical, and highly reliable.

We were particularly interested in the skill-sets that underpinned these behaviours as these could be affected by the selection and training of personnel. In Table II we present and describe the six skill-sets that, amongst our case companies, were believed to underpin the desired behaviour.

As expected, the extents to which these behaviours are demanded of individual staff do vary according to role. For example, a condition monitoring technician will need stronger technical skills relative to an account sales manager, who will correspondingly need to be stronger at relationship building. Yet, to a greater or lesser extent all staff in the front-office will be expected to possess and apply the skills shown in Table II.

5 Organisation and deployment of people delivering advanced services

Across the cases, the policy is to co-locate (most) people who are responsible for the delivery of services in a front-office with its own facilities, processes, and a large extent of autonomy. The term “front-office” refers to a company's departments that come into contact with customers and typically includes the marketing, sales, and other customer facing staff. The “back-office” is the part of the business dedicated to running the company itself and typically includes people who deal with design, development, production, and other activities that are rarely seen by customers. Here, it is important to highlight that the front-office/back-office distinction should not be confused with the physical location of facilities.

All forms of manufacturers have both a front-office and back-office, but in our cases the increased demand for customer interaction results in extensive front-office operations. In Caterpillar, for example, the dealerships can be large autonomous businesses with a range of capabilities including design and production. Similarly, Alstom has extended the operations in their front-office to include personnel being co-located in their customer's facilities. This breadth of operations in the front-office can be thought of as micro-vertical integration, and is impacted by the extent to which the manufacturer retains more conventional production operations and the autonomy of these (Baines et al., 2011). In turn, this relationship also affects whether some service-centred support activities are retained within the production business to smooth integration with the front-office.

Although the breadth of operations in the front-office may vary somewhat, evidence from our cases suggest that there are common structural characteristics to the way in which people are organised. We have set out to summarise these in Table III. Here, the differences are highlighted between the front-office (which focuses on the delivery of products into the field and then the supporting services) and the back-office (which focuses on the design and production of products).

The activities of people within the front-office are then further subdivided. There are front-line staff who interface directly with the customer (such as account managers), and these are directly supported by technical staff (such as condition monitoring technicians). Such technical staff may have similar skills to those in the back office, but their role is entirely focused on services to customers.

The form and extent of interactions with customers varies according to this role. With an advanced services contract the frontline staff will interact with customers perhaps weekly, indeed in some instances staff might be co-located in a control-room which is within the customer's facilities and so meet daily. These might be customer staff who are responsible for managing contracts, or staff who are operating equipment. By contrast, support staff (such as condition monitoring technicians) will interact with actual customer staff much less frequently. They may, for example, enter into discussions with operatives when diagnosing an equipment fault.

Finally, it is important to highlight that amongst the four cases field engineers are often considered as frontline staff for the delivery of advanced services. This occurs because of the frequency and extent of interactions with the customer, especially equipment operatives. So influential are such interactions that in some cases such engineers are scheduled to always arrive at customers facilities (say for scheduled maintenance activities) just prior to equipment being shut down (rather than after). This way the engineer can meet the operatives, so sustaining relationships with customer personnel, as well as gaining insight into any early signs of equipment failure that might go undetected by other condition monitoring systems.

Sustaining the desired behaviour of staff has particular demands of leadership in the front-office. Our case companies indicated the importance of a fair and cooperative culture amongst people in the front-office, along with mutually consistent goals amongst the staff, and a shared interest in being successful. Various techniques were evident in our case companies for achieving such goals. In one instance, there were very clear "rules of the depot" which set out the values and processes of the front-office (in this instance a trackside maintenance facility). Similarly, there was evidence of staff mobility across customers, front-office and back office. In one company it was a norm to recruit staff from the customer into the front-office, with the motivation being that "we must think like the customer and act like the customer". Yet, this policy was carefully managed to ensure that as far as possible relationships were sustained.

Behaviour was also sustained by a comparable balance of power across the front/back offices, and here there appears to be bias towards the office which is the principal source of revenue. Evidence was apparent of front-office staff taking senior positions within the host manufacturer, and this was to ensure all operations are orientated towards customer service. This helped to ensure that the leadership culture was consistent with the expectations and working of the front-office and an acceptance that these may be different to manufacture. For example, managers in the front-office may be more willing to accept the difficulty of attaining the same high levels of worker and machine utilisation than would be normally achieved within production.

Finally, within the front-offices themselves facilities were carefully designed and managed to complement the expected behaviour of people. For example, it is common practice to have a central control room which is the focal point for the management of advanced services contracts. Rolls-Royce, for example, has such a facility that manages gas turbines worldwide (Walters, 2009). Such facilities bring front-office staff physically close together. This stimulates communications, helps build relationships, and provides a hub for the complete solution of a customer's problems. Such facilities are supported by inputs from enabling technologies (Lightfoot et al., 2011) and also help to demonstrate credibility and value to the customer.

6 Relationships between people practices and the delivery of advanced services

The six behaviours and skill-sets summarised in Table II are considered by our case companies to be key to the successful delivery of advanced services. In this section we set out to present this rationale by explaining how the people practices (both organisation and skills) support the attainment of key performance measures for advanced services contracts. Typically, these are measures of asset performance, availability and reliability, which are needed to be delivered at the lowest cost. Figure 1 shows this general relationship as an influence diagram, showing how the practice in people organisation and skill-sets translates into successful delivery of the key performance measures for an advanced services contract.

In Figure 1, we have summarised the practices (as set out in Tables II and III) as humanistic behaviour in a dedicated front-office. Concentrating resources in this way requires the host organisation to setup dedicated facilities, and we have shown in Figure 1 how this will adversely affect the cost of delivering an advanced services contract. By contrast, however, the organisation and skill-sets of front-office people will deliver distinct capabilities in terms of staff flexibility, problem solving, customer relationship, authenticity of decision making, and an understanding of implications of actions. The overall consequence of these is improved maintenance actions and contingencies, such that product performance, availability and reliability are enhanced, while costs are kept to a minimum.

An example of this complete relationship in action occurred in one of our cases. The manufacturer provides a Customer Support Agreement for maintenance on aircraft. The contract specified that any unscheduled maintenance should be performed within two days. The company had an incident where an issue arose with avionics which caused an aircraft to land prematurely in a small regional airport late on a Friday evening. This airport had very limited maintenance facilities.

This incident caused an immediate alert within the front-office control centre of the manufacturer. Staff within the centre had sufficient technical skills to diagnose the problem and identify a solution without having to call on the design specialists. Unfortunately, the lack of facilities meant that repairs would take longer than usual and compromise the contracted aircraft availability. The front-office staff then communicated and discussed the problem and solution with the customer and, because of the strength and credibility of the relationship, the customer was prepared to adjust their flight schedules to accommodate the un-available aircraft. Simultaneously, a repair crew travelled to the regional airport and worked on the aircraft over the weekend to get it operational as quickly as possible.

The aircraft was repaired and was operational by the following Monday and, although this exceeded the window for unscheduled availability, because the manufacturer's front-office staff had dealt with the situation so well no penalty claims we made.

7 Concluding remarks and future research

This short paper has set out to present our preliminary findings about the organisation and skill-sets of people who are in the front-line of delivering advanced services. To achieve this we have introduced our research programme, summarising how we have found people to be organised, outlined their desired behaviour and skill-sets, and then why these practices are consistent with success. To conclude this preliminary report on our research, we have summarised our findings about people in the following hypothesis:

H1. Delivery of an advanced service contract is positively impacted by front-office staff who are humanistic in their behaviour, being skilled in flexibility, relationship building, service-centricity, authenticity, resilience and technical aptitude, as this ensures speed and effectiveness of response.

Our future work will now continue to verify that these are both key factors and subtly different to the behavioural characteristics in a more production-centric environment. We will also set out to combine these findings with our knowledge of practices in facilities, vertical integration, technology enablers, performance measures, and organisational structure and processes. Collectively, these will provide a comprehensive description of the factors that are key to success in the delivery of advanced services, and so are key to the successful adoption of servitization strategies within manufacturers.

Figure 1 Illustrating the relationship between the humanistic behaviour characteristics and key performance measures for advanced services contracts

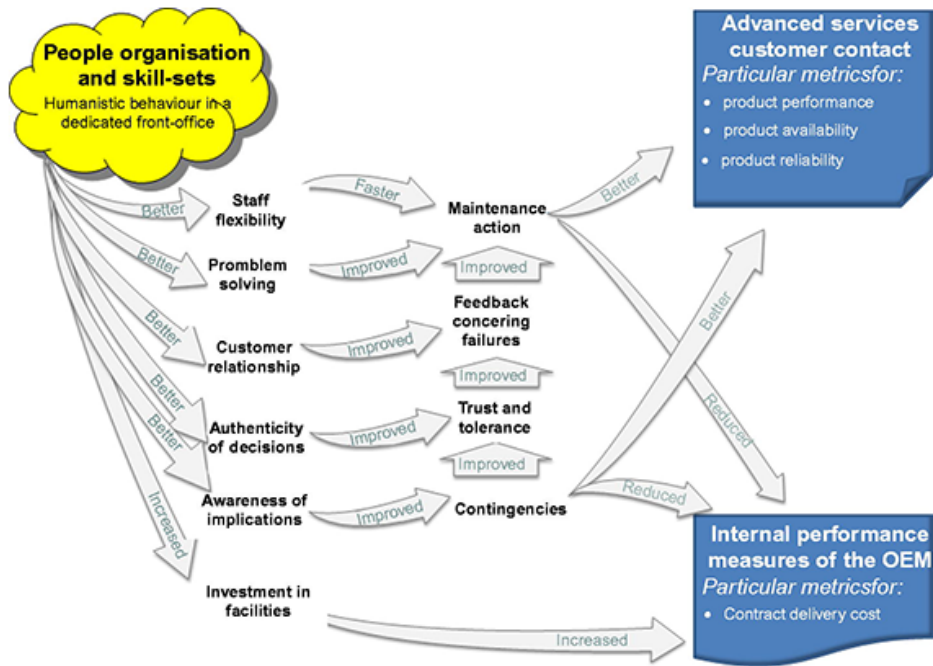


Table I Meta-clustering of services offerings

	Principle on which cluster is defined	Relative characteristics of cluster			Examples of services offerings within cluster
		Range of service activities	Extent of risk	Revenue payment	
Base services	Focus on product provision	Narrow: activities centred on and around production competences	Low: easily delivered for an enterprise with manufacturing competences	Point: largely on completion of contract	Product/equipment provision, spare part provision
Intermediate services	Focus on condition maintenance	Broadening: based on the exploitation of production competences to assure state and condition of equipment	Medium: increased expose to the consequences of equipment faults	Periodic: some upfront and/or on completion. Maybe with interim payments	Scheduled maintenance, technical helpdesk, repair, overhaul, delivery to site, operator training, condition monitoring, in-field service
Advanced services	Focus on outcome assurance	Extended: stretching the manufacturing enterprise to take on activities that are usually internal to the customer	High: financial penalties incurred almost immediately if equipment fails to perform as specified	Linear: pay-through-use with period adjustments in rate	Customer support agreement, risk and revenue sharing contract, revenue-through-use contract, rental agreement

Table II Behaviours and supporting skill-sets of workers delivering advanced services

Desired behaviour	Supportive skill-set	Description of skill-set
Prepared to vary working hours or task to match customer demand	Flexibility	Ability to modify working routine in order to comply with customer requirements
Readily have meaningful conversations with customers	Relationship building	Ability to develop and sustain close customer trust, and similar relationships with other staff internal to the manufacturer
Forging strong people/team relationships with other staff within the front-office		
Appreciating the consequences of an equipment failure on the customers of our customer	Service-centricity	An empathy with customer's problems and delivering against these; capable of putting themselves in the customer's shoes
Talking to people, engaging people, and understand where they are coming from	Authenticity	Genuinely committed to delivering a successful outcome for the customer; prepared to tell the customer the truth
Demonstrating belief in the manufacturer, its products and services		
Only making commitments that can be fully delivered	Technically adept	Understanding of the principal operation and sub-systems of products and equipment
Being able to understand the consequences of an electrical sub-system failure on a machine		
Appreciating when the customer's anxiety is with the situation although it may come across as more personal: being able to sleep at night!	Resilience	Capable of dealing with the personal stress incurred by working at the frontline with the customer

Table III Structural characteristics common in the delivery of advanced services

Categories	Common structural characteristics		
		Front-office	Back-office
Overall focus of staff	Delivery of product-service offerings		Product design and manufacture
Typical role of staff	Frontline customer contact	Support customer contact	Enable customer contact through product manufacture
Examples of staff in role	Account sales/managers, contract sales, field engineers, operations centre manager, customer services agreement manager	Condition monitoring technicians, technical services manager, general managers of parts and service, product support manager	Research scientists, engineering design, production management, production engineering
Usual contact person within customer	Project manager, account manager, equipment operative	Equipment operative	Equipment operatives, project managers, account managers
Extent and frequency of customer interaction	High/maybe weekly	Medium/maybe monthly	Low/periodically and arranged around new product introduction

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