

In search of 'product-service': evidence from aerospace, construction and engineering

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ABSTRACT

It has been argued that integrating tangible products with complementary through-life services into a high value 'product-service' [P-S] solution is increasingly central to the business strategies of traditional 'product-dominant' organisations. This paper explores P-S strategies in three leading organisations in the aerospace, construction and engineering industries. Specifically, the paper explores the meaning of P-S in each organisation, the rationale for P-S provision, as well as the distinctive manifestations and characteristics of P-S offerings. The paper highlights the complexities of concurrently enacting different strategies for product-service integration across different business streams. These appear disconnected from the nostrums and overly simplistic models which pervade the current solutions discourse.

Keywords: integrated solutions, product-service, service, aftermarket

INTRODUCTION

“The new market leaders will be those that have followed a clear road map to success in integrated solutions” [Davies et.al, 2006, 39].

The growth of services is one of the major trends of recent years and is reflected in the changing structures of contemporary economies in Europe, Asia and the USA where services now account for the majority of employment and the bulk of national output. Nevertheless, the term ‘service’ is applied to a heterogeneous range of activities. One definition of is “any activity or benefit that one party can offer to another which is essentially intangible, and does not result in the ownership of anything” (Kotler, 2003, 625). Indeed intangibility is often identified as one of the key characteristics of a service. Other prototypical characteristics include that services are often perishable, difficult to standardise, and do not have a separate point of production/consumption [Lovelock and Gummesson, 2004]. Of course service activities and service jobs are not exclusive to traditional service industries such as hospitality or finance; indeed there is rarely such a thing as a ‘pure good’ or ‘pure service’. The notion of a ‘service mix’ suggests that offerings can more usefully be thought of as a continuum ranging from ‘tangible dominant’ at one end, through to ‘intangible dominant’ at the other [Kotler, 2003; Cohen et.al, 2006].

The focus of this paper is upon engineering organisations which would traditionally be thought of as primarily providing tangible goods. In such industries, the provision of accompanying services to clients has often been thought of as a low value activity. Though services of some description have almost always been offered, they have normally been considered to be peripheral and concerned with routine and reactive

maintenance to support the product. Service arrangements may even have been given away 'free' in order to clinch a potentially lucrative product order. However, organisations in the construction, aerospace, and engineering sectors are all increasingly engaging in 'through-life service' in addition to their traditional product offering. Thus, it has been argued that the traditional view of service as a 'bolt-on' is changing, as contemporary 'product' organisations revise their business models in an attempt to transform their service operations from a 'necessary evil' cost centre, into strategically important profit centres [Lele, 1997]. In advancing the debate, and given the increasingly blurred boundaries between 'product industries' and 'service industries', it is proposed that it is useful to examine the experiences of traditional product-oriented organisations in developing their service offerings.

Indeed, it has been recognised that further research is required to explore the experiences of organisations undertaking the "transition from product manufacturer to service provider" [Oliva and Kallenberg, 2003, 165]. The current literature offers little insight into how attempts to integrate products and services occur and the challenges organisations encounter [Windahl and Lakemond, 2006]. Accordingly, this paper aims to explore what 'product-service' [P-S] means in different sectors, and to understand the rationale for P-S provision. Moreover, it aims to understand some of the key tensions and challenges to effective future P-S provision, by juxtaposing the aspirational intent with the operational complexities that bundling P-S offerings presents. Before presenting the empirical findings from the three sectors, a brief review of the burgeoning P-S literature provides important context.

THE 'PRODUCT-SERVICE' PHENOMENON

There has been a proliferation of research into the general trend away from a 'pure product' orientation towards a combined 'product-service' [P-S] offering. Various terms have been used to describe the phenomenon including 'servicisation' [Quinn et.al, 1990], 'servitization' [Vandermerwe and Rada, 1988; Van Looy et.al, 1998], 'going downstream' [Wise and Baumgartner, 1999], 'winning in the aftermarket' [Cohen et.al, 2006] 'integrated solutions' [Davies et.al, 2006, 2007] and 'new manufacturing' [Marceau et.al 2002]. At the core of most of these phrases is a concern with the provision of additional services which are complementary to a tangible product in order to increase the value for customers [Lester, 1998; Marceau et.al, 2002]. In particular, there is the suggestion that product manufacturers should be attempting to integrate services into their core product offerings to remain competitive [Bowen et.al, 1991; Gadiesh and Gilbert, 1998; Quinn et.al, 1990, Wise and Baumgartner, 1999]. As Cohen et.al comment," This is the golden age of services, and to survive and prosper we're told every company must transform itself into a services business" [Cohen et.al, 2006, 129].

Opportunities for enhanced service offerings can be viewed as a response to the trend of large private sector organisations and governments towards outsourcing many operational and systems integration activities [Davies et.al, 2006; Lojo, 1997]. It may also be viewed as a pragmatic response to the saturation and commoditisation of core product markets, increased price pressure, decreasing product margins and global competition [Gebauer et.al, 2005; Sawhney, 2004]. Benefits for the provider are said to include services often being more profitable than physical products, a source of differentiation in a competitive marketplace, as well as

leading to additional demand for products [Anderson et.al, 1997, Heskett et.al, 1997]. Other benefits are said to include lengthening customer relationships, creating growth opportunities in mature markets, balancing the effects of economic cycles, and in providing capabilities in responding to changing client demands [Brax, 2005].

Given that service of some description has always been offered by many product organisations, the key difference between the 'old service model' and the 'new service model' appears to be that, while the former concerned providing services which support the product, the new service model provides services which actually support the client [Mathieu, 2001]. Vargo and Lusch [2004, 324] go as far as suggesting somewhat controversially that "tangible objects [are] of secondary importance", of little intrinsic value other than supporting service production processes. Thus, a key criterion for becoming 'solutions focused' is that the creation of value must be understood through the eyes of the customer [Brady et al 2005], reversing the traditional view of value creation, which tends to be product-forward in its orientation [Slywotsky and Morrison 1998]. Thus, the new model is said to be primarily concerned with supporting client processes and business strategies. The espoused differences between providing a traditional product and service, versus a more integrated P-S solution are illustrated in Figure 1.

[FIGURE 1 ABOUT HERE]

While truck manufactures might have been thought of in pure product terms (manufacturing trucks), most manufacturers have always offered some services such as financing schemes or servicing agreements. A solutions proposition is argued to

take this a step further in terms of offering the client ‘reduced lifecycle transportation costs’, again reflecting the idea of a shift away from a service supporting the product, towards a service supporting the client [Mathieu, 2001].

However, a key question is the extent to which these ideas are actually new [Antonacopoulou and Konstantinou, 2008], and whether ‘pure product’ organisations ever existed. In the 1970s Levitt argued that all industries are effectively service industries [Levitt, 1972]. A seminal paper by the same author [Levitt, 1960] also proposed that organisations must widen their vision of the markets in which they operate. He uses the example of oil companies redefining their business in terms of ‘providing energy’ rather than merely supplying oil. Reflecting the notion of customer solutions, Levitt has also stated that ‘people don’t want to buy a quarter-inch drill; they want a quarter-inch hole’ [Levitt, 1970; cited in Canton, 1984]. A similar point was made by Drucker in 1970s when he stated that: “What the customer buys and considers value is never a product. It is always utility – that is, what a product does for him” [Drucker, 1973]. Many of *ideas* of which underpin the contemporary P-S debate have therefore been discussed for at least fifty years.

Even though the conceptual foundations are far from new, it has been recognised that there is a need to understand more about current manifestations and implications of P-S across sectors [Windahl and Lakemond, 2006]. For example, the shift towards P-S is said to be particularly well-established in sectors such as civil aerospace and defence procurement, and civil aerospace in particular is considered to be advanced in terms of a shift to the concept of lifecycle management and the provision of complex P-S combinations [Kerr and Ivey, 2001; Oliva and Kallenberg,

2003] Drivers are said to include changing customer demands, the opportunity to increase revenues, and as a way of protecting intellectual property rights and product reputation [Ward and Graves, 2007].

In the context of construction, the concept has a different genesis. The recent wave of interest can be traced to Build-Operate-Transfer [BOT] in the 1980s, but in particular the popularity of Public Private Partnerships [PPP] and Private Finance Initiative [PFI] procurement strategies. PFI can be viewed as a response by the government to control public spending within the Public Sector Borrowing Requirements [PSBR] limits, as well as the allure of achieving 'Value for Money' and transferring risk [Illidge and Cicmil, 2000]. In the early 1990s, PFI was unveiled by the Conservative administration as a means of improving the UK's aging public sector infrastructure stock, addressing the issue of 'backlog maintenance', and keeping inflation under tight control. PFI/PPP has remained a key component of recent Government strategy [HMSO, 2003; Jackson, 2004]. Viewed primarily as a response to changing government procurement strategies suggests a high degree of 'client-pull', in contrast to the 'supplier-push' factors often identified in other sectors such as manufacturing [Gebauer et.al, 2006].

Models of product service

It is claimed that organisations pursuing P-S strategies pass through a number of stages. Van Looy et al [1998: 34] for instance, suggest that organisations seeking to become 'solutions providers' tend to develop capabilities in delivering products and associated services in an integrated manner by passing through three main stages. Initially, the company must possess the capability to manufacture or supply

goods. Next, it begins to offer additional services which complement its product portfolio. Finally, the company practices 'servitization' by marketing different product/service combinations. It is at this stage where opportunities for competitive advantage are said to add value as the offering becomes more strategically aligned with customer need. Similarly, Oliva and Kallenberg [2003] propose a continuum to describe the shift from the product to P-S. Firstly, given that service offerings may have evolved organically rather than strategically, it is possible that they are fragmented and in need of consolidation. Secondly, entering installed base service market and setting up the processes and structures to exploit opportunities. This is followed by expansion into relationship-based services. It is suggested that this may mean a change in pricing strategy away from a 'time and material' system, towards a fixed price over an agreed period.

The research literature also proposes that P-S provision requires a significant transformation in the ways that firms are structured and organised. Most accounts report how manufacturing firms move away from traditional product or service-based units, towards an organisation based on units dedicated to 'front end' and 'back end' activities. Front end units are established to engage directly with customers, from the point of first contact through bid preparation and project execution, to the provision of the required service. In consequence, traditional production and service divisions are transformed into back end units. It is proposed that these new units service the needs of the front end units in terms of product platforms and the service portfolios, which can then be integrated by a strong centre to integrate client and capability requirements to provide tailored solutions [Davies et.al, 2006; Eisenstat et.al, 2006; Galbraith, 2002; Miller et.al, 2002]

Commentators also suggest that an operating model geared towards delivering solutions requires new capabilities [Antonacopoulou and Konstantinou, 2008]. Brady et.al [2005] identify systems integration, operational service, business consulting and financing as the key capabilities. Gebauer et.al [2005] also identify various 'success factors' for achieving high service revenues. These are said to include the development of a market orientation, relationship marketing, a clear service strategy and the development of a service culture. Often, however, the capabilities are expressed only in abstract terms, and reveal little about the realities of organisational attempts to deliver P-S or the challenges encountered [see Table 1].

TABLE 1 ABOUT HERE

Though much of the research literature implicitly supports the principle of traditional 'product' organisations shifting towards solutions, there are also acknowledgments delivering P-S is unlikely to be straightforward. Rather, it is argued that P-S is likely to require the creation of a 'service culture' and an appropriate 'service climate'. Davies et.al [2006] state that, "changing the mindsets of thousands of employees who have grown up with a narrow vision of traditional products or services is perhaps the biggest barriers of all" [p. 47]. For example, while traditional manufacturing/product-oriented values are claimed to include efficiency and the creation of economies of scale, service values are argued to be more concerned with issues around innovation, flexibility, customisation and variety [Bowen et.al, 1989]. It has been argued that an appropriate 'service culture' should be concerned more with combining the two value sets rather than necessarily replacing one with the other [Bowen et.al, 1989]. Of course, in reality the notion of a 'service culture' is

ambiguous, and it is difficult to imagine how such a culture could be embedded or indeed what it would look like. Moreover, a culture change programme is of little use if the underlying management structures and processes are not aligned with business strategy.

Accordingly, this research problematises the delivery of integrated P-S, and considers some of the tensions and challenges encountered in traditional 'product' businesses in moving to a new service model. The rest of the paper is organised as follows. The next section outlines the research methods. Three comparative case studies from aerospace, construction and engineering are then presented. This is followed by cross-case review of the different P-S visions, approaches, and challenges. The paper concludes with a general discussion about the implications of the study and draws some conclusions.

METHODS

Given the research aim to understand more about how and why P-S plays out in different contexts, as well as the need to understand the meanings actors associate with the notion, a case study approach was deemed appropriate [Yin, 2003]. More specifically, a degree of 'purposive sampling' was employed [Patton, 1990], with the organisations demonstrating important similarities (ostensibly involved in P-S, large, complex, multi-site, global, engineering), but drawn from three dissimilar sectoral contexts: construction, electrical engineering and aerospace. The paper draws upon 60 interviews with a range of senior managers and operational personnel conducted in the three case study organisations between April 2006 and April 2007. Interviews were semi-structured and typically between 45 and 90 minutes in

duration. Interview data was supplemented with internal company documentation. The interviews were conducted across three different divisions in each organisation.

The first case study [EngCo] is a leading global multidisciplinary engineering company specialising in power and automation technologies. A total of 21 interviews were conducted with a range of respondents from across their Automation and Power divisions. Respondents were drawn from various parts of the business, ranging from low-tech commodity production items through to high-tech integrated systems for customers in oil and gas and pharmaceutical industries. Interviewees were drawn from a variety of job roles including Service Manager, Service Development Manager and Vice President Customer Support. The second case study company was ConstructionCo, a leading civil engineering and building contractor. A total of 18 interviews were conducted with a range of senior managerial respondents from three main divisions: the civil engineering arm is referred to as 'BuildCo', the term maintenance business [MaintainCo] and a specialist PFI unit [PFI Projects]. At JetCo, 18 face-to-face and telephone interviews were conducted across three divisions [civil aerospace, marine engineering and defence]. In all cases the informants provided a cross-section of perspectives from strategic and operational levels. A particular focus was placed on establishing emergent differences between the sectors.

THREE CASES OF PRODUCT SERVICE

EngCo is a leading power and automation technology company, with clients in industries including Chemicals, Oil and Gas, Minerals, Food and Beverage, Pulp and Paper, and Utilities. The vision is to be a global leader in power and automation

technologies, enabling utility and industry customers to improve their performance, while lowering their environmental impact. Strategically, the organisation was said to be moving along the value chain from being an international electrical engineering company in the 1980s, to a global engineering and technology company in the 2000s. During the 1990s, growth, diversification and acquisitions were said to be the mantra, but following a turbulent period in the early 2000s, the strategy has been refined as the business focuses upon its core power and automation strengths and offerings.

ConstructionCo is a major UK-based construction organisation operating worldwide, and consists of various companies grouped within a devolved management structure. The study focused upon three main divisions: BuildCo, MaintainCo and PFI Projects. BuildCo delivers infrastructure such as bridges, tunnels and roads. MaintainCo is an asset management and maintenance provider working primarily in the highways sector. The PFI Projects division was set up in the 1990s and is an investor in infrastructure assets, from project promotion and development, through to financing, project execution, and long term asset management and operations.

JetCo is a world-leader in the provision of power systems and service. The organisation operates across sectors including Civil Aerospace, Defence and Marine. Civil Aerospace serves international airlines and regional operators, through to small executive jets. The Defence division is a major player in supplying power for military fleets, and Marine is an established provider of marine propulsion and hydrodynamic technologies, supplying both commercial customers and navies. Clearly, the customer base is diverse, ranging from airlines, helicopter operators, to

armed forces and marine customers. It has a global reputation for manufacturing excellence and quality products, which is a determining factor in the success of the organisation. In terms of product offering, their core area of strength is in power/propulsion systems and gas turbine technology. An overview of the main case characteristics is provided in Table 2.

TABLE 2 ABOUT HERE

P-S Vision and Strategy

At EngCo the global organisation has become increasingly interested in providing 'cradle to cradle' asset management over extended product lifecycles, as opposed to the more traditional product sale with a package of routine maintenance offerings. This is thought to be a particularly successful business model in other industries and parts of the world, with a long history in the copper and mining industries of the Americas, and the pulp and paper industries of the Nordic countries. In the UK electrical engineering context, opportunities have been identified in industries including chemicals, food processing, electronics and automotive. The rationale for developing service operations was said to include cycles in product demand, customer demand for support to large and ageing installed base, product commoditisation in some areas, potentially higher margins and smoother service revenues. Retaining the customer through the life of the product and offering a migration path through to new technology was also identified as an opportunity. As such, service was said to help the 'marketing loop' whereby established relationships and proved product performance also support the opportunity to introduce new products to the customer in the future. Reflecting the heterogeneity of clients,

industries and technological environments in which EngCo operate, the service portfolio is extremely diverse ranging from supplying spare parts through to full maintenance outsourcing.

Similarly, at JetCo the service strategy concerns capturing the opportunities associated with a large installed base which requires considerable spares and maintenance activity. Although JetCo has always sold spares, the new service model was described in terms of proactively engaging with customers to provide them with a suite of aftermarket support. Gradually this has concerned entering managed contracts where JetCo actually assume some of the risk. Overall, the development of their service operations has been described as a gradual evolution culminating with the recent introduction of 'total service packages' for customers across industries and sectors. A benefit of offering systematic through-life product support was said to be smoother revenue streams in contrast to the traditional 'time and material' model.

At ConstructionCo through-life service was viewed more as a pragmatic response to an opportunity in the marketplace which arose as a result of government funded PFI projects. PFI provides a means for private organisations to invest in assets, such as schools and hospitals, traditionally funded by the public sector. Projects include schools, hospitals and major road widening schemes, typically operated under a performance-based contract. Product-service was therefore perceived to be a combination of 'market pull' and 'supplier push'. Clients were said to be increasingly seeking improved functionality, whole life costing, greater certainty of performance, and a desire to concentrate on their core business. Equally, potential benefits for

ConstructionCo were said to include the ability to forge more collaborative, ongoing relationships with clients, an earlier involvement in projects.

P-S Implementation

At EngCo, the development of P-S in the UK varied by division reflecting the different industry sectors they serve. Service packages were said to depend on the 'value in use'. Where the consequences of failure can be very high, for example on an oil rig, these sectors demand premium service. Where the consequences of system failure are moderately high such as a factory production line or airport conveyor belts, these require mid-range responsiveness. In parts of the lower complexity commodity business, products can to some extent be serviced by local providers and therefore attract lower rates. The most sophisticated model of P-S, however, is 'risk-reward' maintenance programme known as 'Full Service'. Effectively, a partnership is entered into between EngCo and the client organisation involving jointly agreed objectives, and the sharing of risks and rewards. Potential benefits for Full Service clients are said to include performance/efficiency improvements, reliability, a more strategic/continuous improvement maintenance operation, access to EngCo's knowledge, and the creation of a service mindset and culture. To date, the British market for Full Service was said to have been conservative. While further opportunities are thought to exist within the Automation business, market dynamics in Power were said to have encouraged a slightly different strategy, focusing upon preventative and corrective maintenance, as utility sector clients were said to retain a stronger commitment to keeping engineering maintenance in-house.

Within ConstructionCo the main manifestation of P-S is the provision of through-life service in the form of Private Finance Initiative projects. The company quickly established a reputation as a major player in the PFI arena, and it is hoped that in winning PFI bids, work is created for the sister companies in terms of design, building and maintenance work. BuildCo division has a large turnover and a good track record of winning major projects including highways, marine, tunnelling, water supply and rail infrastructure. MaintainCo is primarily responsible for term-maintenance contracts for the Highways Agency [HA] and Local Authorities [LA], although the scope of the division is said to be shifting towards a more strategic service agenda, shifting from rudimentary term-maintenance to 'network management'. Increasingly, BuildCo and MaintainCo are required to work together to deliver an integrated P-S offering. Indeed, the organisations position as one of the largest UK construction organisations was frequently cited as a source of competitive advantage, as it meant they had a large pool of resources which it could mobilise to meet particular client requirements. It was suggested that clients were becoming increasingly aware of the need for best value rather than lowest cost, and that the recent emphasis had been on relationship building and a move away from one-off transactions. This was inducing fundamental changes in the way in which the divisions did business.

At JetCo, Civil Aerospace has paid significant attention to growing aftermarket opportunities which were seen as complementary to their core product business in a highly competitive marketplace. Aftermarket opportunities were also viewed as a response to the changing strategies of fleet operators wishing to focus upon their core businesses, as several airlines no longer wish to manage their own engine

maintenance activities. Within the Civil business, the view was that it was gradually evolving from a product-centric to service-centric business; no longer merely a provider of a gas turbine product but of 'power' solution. The Defence division was also described as a stable, growing part of the business, with similar opportunities to support equipment with aftermarket services through life. As service has always been offered in Civil, aftermarket services were viewed as an evolution of what the company has always done, as opposed to a revolutionary new business model. Defence has a similarly well-developed aftermarket strategy, delivered to a narrower customer base. The Marine division differed in terms of the diversity of its products and sectors, offering a diverse range of products and systems. Aftermarket service provision is therefore different in Marine reflecting the distinctive needs of the sectors it serves. However, there was also a commitment to growing services, with potential benefits said to include protecting market share, and a more long-term approach to business development. In this respect, there was evidence to suggest that the corporate service strategy did appear to be flowing down through the divisions.

P-S Challenges

Across the cases, several challenges were identified in terms of actually delivering P-S. These included the need to have a clear P-S strategy, a perceived need to embed a service culture, and to join up complex organisations in order to provide an integrated customer solution. Thus, the need for an integrated service strategy was highlighted in each case, as each company consisted of a coalition of autonomous businesses, specialising in products for different markets. While this was generally viewed as both an appropriate and successful model in a product-centric

environment, it sometimes viewed as problematic when delivering joined-up customer solutions. At EngCo and JetCo, service strategies had evolved separately in the different divisions, but there were initiatives in place to align the service strategy and businesses, to provide a more integrated solution to customers. A telling example of the problems fragmentation create was cited at EngCo where it was suggested that customers occasionally had difficulty determining which part of the organisation they needed to contact with queries. Again, at JetCo a formal account management system has been introduced, to ensure a degree of consistency and co-ordination in the management of customer relationships.

In order to support the new business model, a recurring theme was the need to develop a 'service culture'. Although a reputation for product excellence was evident in each organisation, there was a suggestion that this may inhibit the development of the service side of the organisation, for example in relation to knowledge of the external customers needs. This was particularly the case with regards to the responsiveness and speed of delivery required to meet client expectations. For example, it was suggested at JetCo that while airlines plan their operations in terms of minutes, traditional engineering environments operate within a much longer timescale of months or years. Informants suggested that embedding a service culture would require behavioural changes within the business, and there was a feeling that some employees may have little appreciation of the value of services, especially in parts of the business which have little contact with the customer. Such employees saw the organisation as having stepped outside its traditional comfort zone, leaving some uncomfortable with the new orientation of the business. It was suggested that the traditional OEM (Original Equipment Manufacturer) culture had to

be blended with the development of a service culture oriented towards enhanced customer responsiveness. Indeed, to keep meeting client expectations there was a need to be increasingly 'flexible', 'agile', 'speedy' and 'customer focused'. It was also proposed that there was a need to foster a greater internal customer mentality, and to create a greater awareness of how individual functions and individuals fit in with the P-S 'big picture'.

The research also revealed significant differences between organisational divisions in the case organisations. At ConstructionCo, a history of parochialism and rivalries between divisions was described, and this was said to reflect the predominant cultural styles between the staff employed in each division. Employees within BuildCo were described as 'hunters' and those employed by MaintainCo as 'farmers'. Hunters were said to be driven by the adrenaline rush of winning a large high-profile project, completing it quickly and profitably then moving on. There was little empathy with other divisions within the group. However, the traditional 'hard-nosed' mentality was thought to be less pervasive than in the past due to the decreasing use of fixed-price contracts and partnering arrangements. Farmers, on the other hand, were seen as keen to cultivate relationships with clients, a mentality which was said to be more pervasive in MaintainCo and PFI Projects. They were seen as taking a long-range perspective in developing their knowledge of client needs. Thus, considerable challenges remain in terms of delivering a truly 'integrated solution'. Nevertheless, the lack of empathy between the sister companies was recognised by many in each division, and the challenge to deliver an 'integrated solution' was not underestimated.

DISCUSSION AND CONCLUSION

The study has explored how the notion of P-S is understood and enacted in three different organisational contexts, and reveals some striking similarities and differences. All three companies are leading organisations within their respective product market sectors. All three espoused a P-S vision, in terms of a desire to move away from a traditional reactive product-centric business model towards one of long-term customer orientation. However, despite the frequent use of terms such as 'through-life service', 'P-S' and 'integrated solutions' there are no agreed definitions as to what each specifically means, and usage varies by industry, organisation, and even division. Each organisation has always provided some form of service, but there are several important differences in terms of the new timescales [through-life as opposed to ad hoc], strategic importance [central rather than peripheral], potential value [high value rather than low value] and risk [sharing risk/rewards]. Rhetorically at least, there is the connotation of more intimate long-term relationships between the organisations and their clients and the expectation that P-S arrangements can be mutually beneficial [Oliva and Kallenberg, 2003].

The rationale for P-S provision, however, is quite different. The cases of EngCo and JetCo reflect many of the reasons presented in the existing literature where traditional OEM firms endeavour to provide through-life service support for reasons including new business creation, to protect intellectual property, provide a form of differentiation, increase value for the customer, and respond to changing client demands [Mathieu, 2001; Oliva and Kallenberg, 2003; Ward and Graves, 2007]. ConstructionCo, on the other hand, provides the most distinctive context for the development of through-life service support compared with the existing literature:

P-S was viewed more as a pragmatic and opportunistic response to client pull in the form of changing government procurement strategy.

Interestingly, though P-S had been enacted in all three organisations, the way in which this has been managed differed markedly. ConstructionCo quickly set up a greenfield customer facing operation to provide a façade of a seamless integration of product and service offerings. In this respect, the model adopted in this context reflects the recommendations of the solutions literature [Galbraith, 2002; Foote et.al, 2001]. The customer facing operation drew on other parts of the business in a fairly transactional manner which, whilst enabling core strengths and capabilities to remain intact, led to an inevitable fragmentation of delivery and to tensions between the disparate business units. In contrast, at JetCo it was believed that P-S integration required the development of a common service culture, and that investment in culture change would lead to a long term gain in terms of service integration. Furthermore, the various divisions were positioned differently in response to the different market sectors in which the organisation operates. Given the complexity and variety of service provision, the creation of a separate service organisation was not considered to be the most appropriate option. Nevertheless, there was a clear corporate service strategy. EngCo represented a third mixed model in that they espoused a number of divisional P-S strategies supported by a general group infrastructure. Here, tensions lay in determining where the locus of control of the divisions and the group support services lay. It was unclear as to who had responsibility for ensuring that the P-S offering was maintained through robust and aligned systems and procedures. The companies also appear to have parts of the business encountering different opportunities regarding P-S integration, reflecting the

particular needs of their respective client bases. This had led to both parallel and common business strategies being enacted.

The case organisations also appear to be facing some similar challenges delivering P-S including some ambiguity around service strategy, embedding a service culture, and issues of organisational complexity and fragmentation. Clearly within these diversified businesses establishing a common corporate service strategy may be challenging as a result of the different histories, trajectories and technologies of the different divisions, although at JetCo a formal corporate service strategy had been devised. In addition, developing services was only one of a multitude of different business strategies being implemented simultaneously. A common theme was the need to transform the culture of the organisations in a context of product-centric cultures which reside within large heterogeneous complex engineering organisations [Bowen et.al, 1988; Gebauer et.al, 2005]. Lele [1997] has argued that under the old service model, some manufacturers viewed service as a low risk, ad hoc activity, often existing in a department bolted-on to the organisation as a whole. Indeed, some traditional product organisations are argued to have in a sense 'benefited' when their product failed and a repair opportunity arose [Gebauer and Fleisch, 2007]. The new service model, however, requires a long-term view of the business. This is likely to be essential if the organisation is to become closer to the customer in order to gain an insight into the world in which they operate, shifting away from a service supporting the product, towards a service supporting the client [Mathieu, 2001].

A focus on 'culture change' alone is not enough; rather there is a need for a more fundamental review of management practices [Oliva and Kallenberg, 2003], and the extent to which they support or hinder business strategy. Given the complexity of organisational structures and priorities it is unsurprising that there may be a lack of buy-in among some grassroots employees. The complex nature of large global organisations was also a recurring challenge. The old 'product' business model was characterised by dividing the business into specialist component parts, but P-S means that product, sales and service organisations are now required to work together much more. The new business model therefore requires greater co-operation and co-ordination within complex, divisionalised, global organisational structures to deliver an integrated solution [Miller et.al, 2002; Windahl and Lakemond, 2007].

Overall the study has highlighted the complexity of P-S delivery, and in turn questions the inevitable oversimplifications made in the literature regarding successful recipes or blueprints for the successful delivery of P-S. It is argued that there is an urgent need for a more sophisticated and nuanced understanding of complex, sector specific strategies for delivering P-S. As the case studies have shown there are not only stark differences between the organisations but equally important differences within the organisations in terms of technologies, products, client demands and economic cycles. It is therefore difficult to see how a particular instrumental solution can automatically be transferred from one organisation to another or indeed from one part of an organisation to another.

A number of conclusions can therefore be drawn. Firstly, the study has highlighted significant limitations of the existing literature and in particular the lack of sensitivity to the different contexts, meanings and manifestations of P-S strategies which exist. As the introductory section made clear, P-S is a broad term applied loosely to a variety of different organisational strategies and offerings. Yet when the meaning is probed in any depth it becomes clear that definitions and rationales vary significantly. As such there is a need for a greater awareness of the different manifestations of P-S. Clearly the key ideas of P-S are but new, but another important question concerns the extent to which espoused organisational P-S models are really 'new'. In some cases, it may be used as a new fashionable label for what the organisation has always done. In others, it may describe an aspiration but not necessarily where the organisation is, or where it is going. Alternatively, organisations may have captured many of aspects of P-S but the revised business model may still be evolving.

The literature also oversimplifies the reality of delivering P-S as a result of the normative nature of current P-S prescriptions. The formula for success appears deceptively simple, with a general consensus emerging around, for example, the 'need to restructure', 'develop capabilities', and facilitate 'cultural change'. Our study reveals that the reality of P-S strategies and processes is not as linear as the current literature implies [see for example Oliva and Kallenberg [2003]; Van Looy et.al 1998]. While the literature implies a neat change process comprising unfreezing, changing, and refreezing [Lewin, 1951], the case studies in this research suggest that this view attempts to solidify a complex and dynamic process occurring in an environment characterised by perpetual transition, rather than 'quasi-stationary equilibrium'. The

organisations were all complex pluralist coalitions, in stark contrast to the unitarist assumptions underpinning much of the 'one-size fits-all' best practice recommendations. The P-S models available oversimplify what are sector-specific strategies for delivering P-S, and there is a need for a more sophisticated understanding of the emergent realities and manifestations of P-S in these sectors. This may reflect the methodological limitations of the literature. Gebauer et.al [2006], for example, base their 'success factors for high service revenues' upon one day site visits to five organisations which they had identified as 'successful' in service revenue terms. Inevitably, this can only provide a crude snapshot into such a complex phenomenon. More detailed research is needed which reveals the experiences of organisations striving to achieve the P-S vision.

Finally, there is a general lack of a critical debate around the issues. Many studies take for granted firstly that a transition to P-S is happening and secondly that it should be happening. Often the significant risks involved are overlooked. The problematic realities of concurrently enacting different strategies for P-S integration across different business streams appear disconnected from the nostrums and overly simplistic models which pervade the current solutions discourse. As a result the research, like the consultancy literature, is overwhelmingly normative focusing on establishing 'roadmaps' to the much-vaunted high service revenues. Yet the recommendations tend to be vague and rhetorical, offering little real guidance. They also overlook the variety of paths to P-S which this study has demonstrated. It is worth remembering that the number of manufacturing organisations achieving a high proportion of their total revenues through services remains low [Gebauer and Fleisch, 2007]. Undoubtedly engineering organisations may be finding potential

service revenues alluring, but any roadmap to success in product-service delivery remains elusive.

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TABLES AND FIGURES

Figure 1: Shifting towards 'solutions'

Industry	Traditional product +	Value Added Service =	Traditional Value Proposition	Solutions Value Proposition
Truck manufacturing	Trucks	Finance Servicing	'We sell and service trucks'	'We can help you reduce your lifecycle transportation costs'
Aerospace components	Aerospace fasteners	Application/design support	'We sell high performance fasteners'	'We can reduce your operational costs'
Utilities	Electricity	Energy asset maintenance	'We provide electricity reliably'	'We can help you reduce your total energy costs'
Chemicals	Lubricants	Usage and application design Lubricant analysis	'We sell a wide range of lubricants'	'We can increase your machine performance and uptime'
Pharmaceuticals	Drugs	Product-support Outcomes driven information database	'We sell pharmaceuticals'	'We can help you better manage your patient base'

Source: Booz Allen Hamilton Inc [1999]

Table 1: Recommendations from the research literature

Source	Recommendations for product-service solutions	
Gebauer et.al [2005]	<ul style="list-style-type: none"> • Establish a market-oriented and clearly defined service development process • Focus service offers on the value proposition to the customer • Initiate a clear relationship marketing • Define a clear service strategy • Establish a separate service organisation • Create a service culture 	
Miller et.al [2002]	<ul style="list-style-type: none"> • Strong front ends to cater to clients • Responsive back end units to create and leverage capabilities • Strong centre to reconcile client and capability requirements 	
Davies et.al [2006]	<ul style="list-style-type: none"> • Systems integration • Operational services • Business consultancy • Vendor financing 	<ul style="list-style-type: none"> • Back end capabilities providers • Front end customer facing units • Strategic corporate centre

Table 2: Cross-case comparison of product-service

Case company	EngCo	ConstructionCo	JetCo
Main sectors	Engineering	Construction	Aerospace, Marine
Operations	International	International	International
Divisions studied	<ul style="list-style-type: none"> Automation technology Power technology 	<ul style="list-style-type: none"> Build Co (roads, tunnels, bridges) MaintainCo (roads) PFI Projects (investor in roads, schools, hospitals) 	<ul style="list-style-type: none"> Civil aerospace Defence aerospace Marine (propulsion, motion control)
Typical clients	<ul style="list-style-type: none"> Manufacturers, utilities, chemicals, food and beverage, pulp and paper 	<ul style="list-style-type: none"> Government/local authorities 	<ul style="list-style-type: none"> Commercial airlines, governments/military/navies
P-S Rationale	<ul style="list-style-type: none"> Cycles in product demand Large installed base Product commoditization Smoother revenues Closer client relationships 	<ul style="list-style-type: none"> Closer client relationships Smoother revenue streams Client demands for whole-life costing, functionality, greater certainty of performance, desire to concentrate on core business 	<ul style="list-style-type: none"> Closer client relationships Changing client demands Smoother revenue streams Large installed base
P-S Terminology	<ul style="list-style-type: none"> Lifecycle management 	<ul style="list-style-type: none"> Private Finance Initiative projects 	<ul style="list-style-type: none"> Aftermarket services
P-S Offering	<ul style="list-style-type: none"> Automation and power products + through life maintenance 	<ul style="list-style-type: none"> Project management, building + through life maintenance 	<ul style="list-style-type: none"> Gas turbine engine products + through life maintenance