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## FROM 'GUYS WRITING SOFTWARE' TO PSS: the progression of an SME

Sara Mountney and Paul Rawlinson

### ABSTRACT

**Purpose:** This paper is an illustrative case study of a service-based company moving into product development and manufacturing to present a complete integrated system to the customer.

**Design/Methodology/Approach:** The timeline of events has been collated through an interview with the managing director, with additional information obtained from the organisation's website. Three particular organizational milestones – a move into manufacturing, additional revenue streams and increasing R&D capability - were identified as particular points of interest. These have been discussed and interpreted according to definitions of servitisation, productisation and product service systems.

**Findings:** This is a commentary on the evolution of a business over the course of 15 years, from an initial services company to a product-service system producer. Also noted are some elements of advanced services, in the way that payment from the customer are structured.

**Originality/Value:** Service organisations which have moved into product development and manufacturing are not widely documented. This case represents an illustrative addition of productisation in practice to add to the body of literature. It also considers a link between productisation and subsequent servitisation as a topic for further investigation.

**KEYWORDS:** productisation, servitisation, manufacturing, service organization.

### 1. INTRODUCTION

Following the concept of service dominant logic (Vargo and Lusch 2004), organisations can be viewed in terms of their overall solution to the customer, rather than in terms of their output, be they products, services or a mix. The movement of organisations from being purely product-based to adopting services, known as servitisation (Vandermerwe and Rada 1988), explores methods by which traditional manufacturing companies have achieved this.

The term productisation has been used to describe the packaging of service offerings, which can include the physical embodiment of the service (described as '*productisation of products*'), particularly for mass market appeal (Harkonen et al 2015). Less explored is how the development of manufacturing capability has been adopted for product development in a primarily service organisation.

This paper presents an illustrative case study of a start up company which evolved from a software company to a systems integrator over the course of fifteen years, through product development, the development of manufacturing capability and an integrated product / service offering. It is part of preliminary research exploring the possible link between productisation and servitisation.

### 2. BACKGROUND

Service dominant logic emphasises the primary value adding activity of an organisation as meeting a particular customer need, hence all provisions, be they products, services, or a mix of both, can be seen as a service (Vargo and Lusch 2004). In their definition of servitisation, Vandermerwe and Rada (1988) present a progression through the provision of goods, to added services, to self-service and knowledge

(for the customer). Although they highlight that servitisation could be approached from either a product or service-based starting point, this term has been primarily used to describe the addition of service activities in a product based organisation as a method of improving the overall customer offering. Servitisation can be seen as an integrating activity, the method by which the organisation moves from seeing a customer offering as pockets of discrete, tangible offerings to an overall, primarily intangible whole value solution (Tukker 2004).

A form of servitisation is the product service system (PSS). Here, the combination of products with services has evolved to an overall offering to satisfy the customer, from which neither can be treated independently. The focus moves along a continuum from pure product to pure service, with product oriented, use oriented and results oriented interim stages, taking increasing responsibility for through-life cycle costs and consumption (Tukker 2004). Baines et al (2013) describe the augmentation of a product with servitised provision as a continuum from base, intermediate to advanced services, with the supplier taking increasing responsibility for revenue and risk from the customer.

Servitisation and product service-systems are seen as methods by which traditionally product-based organisations can compete with lower cost global competition (OECD 2007). Consequently, the majority of research is focussed on servitisation as a one way process which commences with manufacturing organisations, and on addressing the challenges facing them. In recent examples, Marquez et al (2013) used a case study of a community transport partnership to propose a methodology for PSS, highlighting product design, service design and sustainability activities. In developing and testing a concept framework to align product and service-oriented production structures in a machine tool company, Peillon et al (2015) questioned the viability of the pure service results-based (or advanced) service extreme of the service continuum as a suitable outcome, noting that this may result in de-skilling for product development in an organization.

Productisation has been defined as *'the process of analysing a need, defining and combining suitable elements, tangible and intangible, into a product-like object, which is standardised, repeatable and comprehensible'* (Harkonen et al 2015). Four types of productisation were defined, including productisation of products, which encompasses development of tangible products to meet customer needs and 'productisation of services, where services can be packaged into discrete and standardised units, tailored to meet customer requirements in wide range of situations (Harkonen et al 2015).

Some preliminary investigations have examined the presence of productisation in the servitisation environment. For example, Baines et al (2011) refer to the *'productisation of services'* to describe the development of a small-scale remanufacturing facility for obsolete components to augment the provision of advanced services.

A more recent example highlighted the case of a service-based SME organisation which had used a productisation approach to widen the scope of its business, moving into product development and acquiring manufacturing capability (Mountney et al 2016). However, such cases are not widely documented. The existing research tends to focus on one specific approach (i.e. servitisation or productisation) and not the relationship between both. A case study tends to focus on one particular point in time, rather than how an organisation has evolved using these approaches and how they have impacted on them.

The adoption of productisation in service organization presents an interesting research challenge, particularly where physical product development activity is involved. They are a counterpoint to the emerging research on manufacturing organisations and their adoption of servitisation practices. They also provide a means to exploring the relationship between productisation and servitisation. Identifying such cases and exploring the motivations for their transformations and mechanisms by which this has occurred are worth of further investigation.

### 3. THE CASE STUDY

This paper presents an illustrative case study of an organisation which has moved from being a small service (software) organisation to a full systems integrator with an R&D focus, since its formation in 2001. It forms one of a series of case studies which are in the process of being identified and investigated (for previous work in this area see Mountney et al 2016). All cases are selected from the following characteristics:

1. They have been initially formed as service organisations.
2. They are SMEs.
3. Their overall offering to the customer can be described as a service, in that it can be substituted for a process, or part of a process for which the customer would normally take responsibility.
4. At some point in their history they have commenced the development of physical products to provide this offering, and they take direct responsibility for this.

This paper presents a narrative of the development of the organisation from a single viewpoint of its managing director. Additional information has also been obtained from the company website. The data was obtained through the recording and transcribing of an interview. The duration of the interview was just over an hour and the results are reported in the next section. From the interview, a timeline of events was established which traced the evolution of the business. Within this timeline, three milestones were identified which were judged to have significantly impacted on the organization. These three milestones are highlighted and analysed as events featuring elements of productisation, servitisation, and product service systems.

#### The Organisation and its History

TBG Solutions is based in Chesterfield in the UK and employs 34 engineers. It specialises in test, measurement and control services. It designs, builds, installs and supports customised installations to a range of industries. Of its main customers, 50% are from the aerospace industry, with other sectors including manufacturing, power generation and automotive. They have provided over 300 bespoke solutions to 85 international customers. There are three main activities in the organisation:

1. Bespoke testing solutions (outlined above).
2. Ongoing service and support;
3. Research and Development projects.

The organisation brands itself as '*delivering the unseen*'. It sees its main business activity as '*delivering capability to test products*.' An example of one of its products is shown in figure 1 – a test facility for Alstom, which measures voltage source converters for power generation and delivery.

The company was formed in August 2001 by three electrical and electronic engineering graduates, one of whom had worked in software development for National Instruments during his third year placement. They decided to set up independently, with a view to becoming a UK partner organisation. By 2003, the company had won its first major contract, had a staff of 8 and had moved to larger premises. By 2006, the organisation was moving into providing full systems integration, including software, electrical systems design and design and building of the installation unit (hardware). A small manufacturing facility was established in 2007 (now 5000 sq ft) to enable the company to do this. During this time the bespoke solutions business continued to grow, ramping up considerably after the development of manufacturing capability. An additional service and support division also gained momentum in customer support and upgrading activities.



Figure 1: Test facility for Alstom (reproduced by kind permission of TBG Solutions)

In 2013, the organisation added a new Research and Development division to its portfolio. This division looks at developing solutions to new situations, using their existing capabilities, but out of their current business scope. Five projects are currently ongoing and are investigating applications for medical applications and noise cancellation. All projects are either self-funded, funded through research grants or R and D tax credits and are in conjunction with an external partner, who provides the business case for development. Should the results of the activity prove to be marketable, the activity will form a new arm of the organisation. If it is not seen as being of interest to the business, the IP will be licensed elsewhere.

There are three particular points of interest in the timeline which will be discussed in turn:

1. The move into manufacturing.
2. Revenue streams for service and support.
3. The move into Research and Development.

#### The Move into Manufacturing

*'We were providing the software, they (the customer) were getting it built elsewhere... they said listen, we don't want to manage that process. You guys need to grow, because we want to buy the full solution from you.'*

The initial move into manufacturing was triggered by customer demand. Initially, the organisation provided the test software and the customer was responsible for commissioning and integrating the testing installation. Problems would arise with integrating the unit, which prompted the customer to request a full solution from the organisation, as a way of sub-contracting the entire systems installation. The organisation initially attempted to design and build the whole unit themselves, however it became clear that their current (software) skills set was inadequate for this and a solution would need to be sought from outside. A Production Director was appointed and a small manufacturing facility commissioned, with the production engineering arm gradually recruiting more engineers. The manufacturing side is involved in all stages of product development for the whole unit, including the specification and design of software and hardware, electronics systems and fixturing. Complex manufactured parts, such as customised connecting units, are design and manufactured in-house, whereas low value, standardised items (such as

the unit casing, which is low value sheet metal working) are sub-contracted. The organisation prefers to recruit experienced manufacturing engineers from outside, recognising that the timescales to develop a competent engineer can be longer than that for their software / systems integration engineers.

*'But what I suppose our added value is: it's the design, it's the electronics, it's the wiring, it's the fixture machining. So we have some quite complex fixtures...So we're very much, as an integrator we're a value-adding business'.*

#### Revenue Streams for Service and Support

Initially, each bespoke product was charged to the customer as a one-off capital expenditure charge, payable over five instalments (with the final payment with delivery and installation). Additional service and support was then added, as a standard % charge per annum of the unit price as a retainer. The organisation found this a challenge for two reasons: the first was the nature of the service being provided was not always evident to the customer, particularly if the unit was working reliably. The second was that a further way of balancing out the '*peaks and troughs*' in the revenue stream and maximising the value of each unit to the business was sought.

The arrival of a new service and support manager with extensive experience in the industry developed the support offerings further, defining particular services to justify the ongoing charge. These included telephone support, repairs, validation and service visits. Although these enabled the charges to be justified, some organisations were still reluctant to fund the cost of this as an ongoing charge.

A further solution to this was provided by a charging model which is referred to as 'Op Ex', in that the customer can work these payments into their operating expenses. In this model, the unit is effectively leased for a specified charge to the customer, payable annually, for a contracted number of years. During this time, the organisation retains ownership of the unit. At the end of the contract, the customer has the option to return the unit or continue leasing, although currently most continue to lease. The additional service and maintenance activities are included in the lease charge. Any additional new functionality or upgrades are provided through either a one-off capital expenditure cost, or worked into the lease charges. The managing director views this as a 'pay for capability' rather than a 'pay for use' arrangement, as the organisation is paying for the organisation's IP (although this has been developed to the customer's specification). This model has had two advantages. Firstly, the organisation has found it easier to 'sell' their service and maintenance provision to the customer. Secondly, it has created more standardised revenue streams into the business itself. The first 'Op Ex' model was implemented in 2006 on one of the company's existing installations because '*it was our product – it was the first opportunity to set the rules*'.

#### The move into Research and Development

It could be said that the organisation's first moves into developing this side of the business were founded on serendipity, rather than planning. Initially, the organisation acquired the funding but was not sure how to integrate these activities with their existing business activities, until it was recognised that this was an opportunity to develop a new division. With external partnerships being established with a range of research institutions, the opportunities for this new division are now beginning to be realised.

The organisation has a risk mitigation approach to research and development, in that it will only work in partnership with a potential customer in the development of an idea which they are sure can be taken to market. Hence, the impetus normally comes from a potential customer or the market. The research is either self-funded or funded through grants, with the recognition that any offerings developed and taken to market will cover the research costs and be profitable. Two examples of R&D projects are:

- A system for monitoring the alarms on observations equipment in single-bed intensive care rooms for Sheffield Children's Hospital.

- Noise cancellation for dentists' drills, with Brunel University.

#### 4. DISCUSSION AND ANALYSIS

In this section, the three milestone events in the timeline are discussed further. The events are interpreted according to the established definitions of productisation, servitisation and product-service systems.

##### The move into manufacturing

According Harkonen et al (2015), *'Productisation, in the context of physical products and those that contain both tangible and intangible elements, involves engineering-related aspects and supports the development of products and their introduction to the market.'*

The organisation moved into product development in order to create a complete, physical product solution. As a consequence, the organisation also expanded its service offering through vertical integration, by adopting responsibility for some operations previously carried out by the customer. Indeed, the main driver for this had been the customer's unwillingness to carry the risks involved in installation. The organisation were willing to manage that risk, seeing an integrating activity as an opportunity to reduce it.

It is interesting to note how the organisation responded to this request by acquiring and investing in the manufacturing capability itself, rather than form a partnership with an existing supplier. This in itself created challenges for the organisation in developing the resources, knowledge and skills required. This was resolved by initially bringing the skills in from outside the company through recruitment and using this as a base for expanding operations in this area.

The organisation did not acquire manufacturing capability in order to transform into a manufacturing organisation. It saw this as an opportunity to further extend its commercial remit to add further value for the customer.

These activities are interpreted as being an example of productisation of products as defined by Harkonen et al (2015). Furthermore, they are viewed as being a mechanism to further increase the overall service offering to the customer.

##### Development of additional service offerings

Harkonen et al (2015) also define productisation in the context of services having *'a specific role in clarifying the service offering, creating repeatability and enhancing understanding of the offering.'*

The service to the customer, which previously had been a definite (software) service, is embodied in a product, and in this case a physical product, and is seen as such by the customer. This may have made it easier for the customer to view the service as a tangible product over which it had ownership, which may be why some of them needed to be convinced over the additional service and maintenance charges.

In addition to the development and manufacturing of the products themselves, there are instances of further development of the services offered to the customer, which can be interpreted as further servitisation within the organisation. Again, a main catalyst for this was the arrival of new knowledge and experience into the business with the appointment of the new sales and service manager. Under their remit, the service and maintenance services available to the customer were defined more clearly, to better justify the additional support charges.

## Revenue streams for service and support

The customer offering from the bespoke division, with its mix of physical installed product and ongoing service and support, can be seen as a product-service system. Central to this is the way in which the organisation charges for the system. TBG's offerings are therefore interpreted as examples of product-service systems. Table 1 below is an illustration of how these product-service systems can be defined according to the two models proposed by Tukker (2004) and Baines et al (2013):

PSS Definitions according to Tukker (2004)	PSS Definitions according to Baines et al (2013)	Activities at TBG which can be interpreted as evidence of PSS
Product-oriented: Product is sold, extra services support product in use.	Base services: Product is sold, extra services support product in use and risk is low.	
	Intermediate services: Customer has ownership of product (although payments may be staged), enhanced services to assure condition of product in use.	Initial integrated offering to customer involving staged payments and added customer support payments.
Use-oriented: Provider owns and is responsible for product, which is leased to customer.	Advanced Services: leasing agreement, activities undertaken by provider include processes previously undertaken by the customer.	Enhanced offering to customer involving 'Op Ex' model.
Result-oriented: Offering to the customer is an activity rather than a product and revenue is linked with use.	Enhance service offering.	

Table 1: TBG's activities compared to definitions of PSS

The 'Op Ex' method of leasing, with integrated service activities, can be viewed as being an example of advanced services according to Baines et al (2013). The solution is specified by the customer, yet the organisation retains ownership. Furthermore, the offering of a lease payment system appears to have changed customers' perceptions of the service and maintenance part of the contract. It appears that they now see it as an integrated activity, part of the solution for which they are paying, rather than an additional offering.

The organisation is clear the leasing option has been introduced primarily for their benefit, rather than the customers, but it appears that this solution is mutually beneficial.

## Additional Discussion

Existing research has tended to focus on aspects of servitisation and productisation independently. This case highlights how both can be evident in the evolution of a company. It would be useful to explore further if, and how, the one could affect the other. It could be said, for example, that productisation had enabled the development of advanced services and a product service system. However, there is insufficient evidence available in this account to establish this, however it is worthy of further investigation.

It would also be useful to investigate this case further to establish whether the evolution to product-service systems was a pre-requisite for the organisation's current move into R & D.

This is also an account of these in an SME, particularly in the offering of advanced services, and is

therefore a useful illustrative case study to add to the documentation of such businesses.

## 5. CONCLUSION

This illustrative case study highlighted the evolution of a small organisation over fifteen years, from a software services to offering advanced services through a product service system. There were three milestones in achieving this: the move into manufacturing (interpreted as productisation), the development of advanced services through the development of alternative revenue streams (interpreted here as product-service systems) and using this as a platform for moving into more research-intensive technology transfer activities.

## 6. FURTHER WORK

Further investigation and analysis into this organisation is planned to establish the following:

- The role of productisation in enabling the organisation to move to product-service systems.
- The role of developing product service systems in enabling the organisation to move into R&D.

It would be interesting to establish if there is a link between the two, and the organisation's strengths and weaknesses relating to this.

This work forms part of an ongoing study into establishing the relationship between servitisation and productisation.

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