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Strategic roles of service sites: application of Ferdows's model

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Abstract

Purpose – The purpose of this paper is to examine the applicability to the service business of general models used in the manufacturing environment. This is done by applying Ferdows's model, "the strategic role of the plant", in two cases.

Design/methodology/approach – This study uses the case approach. One case (IBM Nordic) is based on an interview, while the other case (Google) relies on secondary data. In each case the operations are mapped on Ferdows's model.

Findings – The cases indicate that the same kind of roles can be found in the service business as in traditional manufacturing environments, and that these roles are widely used. However, for communicative purposes, the model was terminologically slightly modified.

Research limitations/implications – Although this study presents the findings of only two cases, the knowledge of material available from public sources leads us to believe that these findings are universal. The model is easy to communicate in the service sector and is thus a very valuable tool.

Originality/value – Models used in the traditional manufacturing and operations management environment have not yet been fully discovered by, nor sufficiently applied in, the service sector. Academics and practitioners are busy trying to create new models in this sector, without noticing that the "old" tools are still usable. Benchmarking against the models used in other sectors might be a worthwhile exercise.

Keywords Benchmarking, Service operations, Roles

Paper type Research paper

1. Introduction

Manufacturing companies around the world have placed increasing importance on services. Instead of "pushing" products onto the market, modern manufacturers have started to redistribute and reorganize the responsibilities of their upstream and downstream operations by planning for customer value creation. At the same time, end customers have changed their notion of a "product" to entail not just the physical product attributes but also the services they expect to be offered in conjunction with the product. Furthermore, traditional manufacturers and other industries have developed services as a source of competitiveness and differentiation because consumers are increasingly realizing the value of services and hence are demanding more and better services at an accelerating pace. This phenomenon has been greatly influenced by technological advances and the internet, which have multiplied the scale and scope of services available to end customers. As a result, modern firms are under pressure to "servitize" their businesses.

Yet, the models and tools used to analyse service businesses are clearly lagging behind these developments, especially compared to those used by the manufacturing

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industry. Scholars are busy developing new models and structures when undertaking analyses and are trying to understand the nature of service businesses. Vandermerwe and Rada (1988) discussed the term servitization and the classification of services has been considered by many authors, e.g. Trott (2008) and Johnston and Clark (2005).

A rare example of such analogous research can be found in Youngdahl and Ramaswamy (2008), a study in which Ferdows' (1997) classic manufacturing context model was used to analyse service offshoring. Their conclusion was that "the value of these frameworks lies in their ability to clarify the strategic roles for offshoring service and knowledge work". Similarly, Stringfellow *et al.* (2007) refer briefly to Ferdows' model in the service offshoring context. However, this model has not been utilized to analyse services in a broader sense than offshoring. Another tool used in the service environment borrowed from manufacturing is the product – process matrix by Hayes and Wheelwright (1979a, b). This model was modified for the service environment by Apte and Vepsäläinen (1993). This later became part of many text books in various forms (e.g. Gemmel *et al.*, 2013, p. 58; Slack *et al.*, 2010, p. 92).

This gap has been noticed by certain scholars and some work has already been done to fill it. However, it seems that the considerable potential for analogous research in the service business, drawing on models familiar in the manufacturing context, has been neglected. The aim of this research is to fill this gap by applying Ferdows' (1997) "strategic role of the plant" model to service businesses. The reason for using the model in this research is Ferdows' (1997) statement that "Superior manufacturers gain competitive advantage by methodically upgrading the strategic role of their plants abroad".

1.1 Objective and purpose of the paper

The objective of this paper is to test and apply Ferdows' (1997) strategic role of the plant model in a service environment and to discuss how the model can be utilized in service businesses. The research questions are:

RQ1. Does Ferdows' model suit the service industry?

RQ2. Can the roles mentioned in Ferdows' model be found in the service environment?

The case study approach was chosen as the methodology for testing the model. Two case companies, Google and IBM, were analysed using the model drawing on secondary data; in the case of IBM, the data were verified by interviews.

This paper is structured as follows. The paper begins by briefly reviewing the relevant literature, presenting the methodology for this study and introducing Ferdows' (1997) model in more detail. Thereafter, the outcomes of the case analysis are presented. Finally, the paper concludes with a discussion of the results, the limitations of this research and directions for future studies.

2. Literature review

There has been a major shift in the output of western economies over the past 30 years. In many countries services have overtaken traditional manufacturing and now account for more than 75 per cent of GDP (Trott, 2008, p. 454). This signals a radical change in society and the business environment. It has been facilitated in part by service innovations, technology and the internet, and the effects are visible in both the public and private sectors.

Services such as accounting, transportation and advertising were among the first to be purchased in the B2B markets as firms started to focus on their core competencies

while outsourcing the rest beyond the so-called core. Along with industrial growth there arose a need for industrial services, such as customer services, maintenance and other supporting functions. In response to this wider societal and economic development, the term servitization (Vandermerwe and Rada, 1988) was coined to describe the changing relationship between physical products and services. The notion has since evolved and nowadays it is understood in a broader sense as the process by which companies create and offer solutions driven by real customer needs, entailing a mixture of both product and service characteristics. Similar descriptions of the phenomenon are provided by a wide array of researchers (see, e.g. Johnston and Clark, 2005; Trott, 2008).

Growth in the supply of knowledge-intensive business services has also contributed to the emergence of the service sector (Miles *et al.*, 1995). One key factor driving this growth has been the increasing tendency for firms to implement complex information technology (IT) systems which require a high level of professional skills for their optimal use and management. The result has been a thriving IT consulting industry, born in response to the need to help firms with these challenges.

At the same time, the scope of outsourcing has broadened as it has become increasingly popular to outsource complete solutions instead of single tasks relating to individual business units. A complete solution could include trusting external firms to take care of all marketing, manufacturing, or research and development (R&D), for example. The most important drivers have tended to be perceived needs to reduce operational costs (Lacity and Hirschheim, 1993), focus on core competencies (Quinn and Hilmer, 1994), transform fixed costs to variable costs (Alexander and Young, 1996), locate as close as possible to customers and gain access to qualified personnel (Manning *et al.*, 2008). As the range of services is very broad and the types of services can be arranged in different ways, the nature of services is discussed in the following section. Following that, we present Ferdows' (1997) model, the suitability of which for application in the service environment this paper investigates.

2.1 The nature of services

Some common characteristics of services are intangibility, heterogeneity, perishability and the simultaneousness of consumption with production (e.g. Gemmel *et al.*, 2013, p. 10; Krajewski *et al.*, 2010, p. 26). Intangibility means that services are unobservable by the human senses. Heterogeneity refers to the idea that all customers experience a service operation uniquely, which is an important concept for companies to understand as they strive to standardize their service operations and measure customer satisfaction. The simultaneousness of the consumption and production of services implies that services cannot be inventoried, which again makes analysis of the quality of services cumbersome.

Another important characteristic that distinguishes one service from another is the level of customer contact required within the service (e.g. Gemmel *et al.*, 2013, p. 19). The more customer contacts and interaction the service requires, the more difficult it is to standardize the service and the heavier is its cost structure, for example due to different skill requirements. The opposite also applies. With lower levels of customer contact, there is a greater possibility of standardization and operational cost saving (Gemmel *et al.*, 2013, p. 18).

These characteristics affect how service operations are organized – which parts of the service belong to front-office operations and which to the back office or, in other words, which parts of service operations are visible to the customer and which are not

(e.g. Gemmel *et al.*, 2013, p. 139; Krajewski *et al.*, 2010, p. 117). This is greatly affected by the level of customer contact the service requires. Front-office operations are typically those that require higher levels of customer involvement, whereas back-office operations have fewer direct contacts with the customer. Front-office services are often offered through multiple channels such as call centres, contact desks or web pages, whereas back-office services are usually only used internally to support front-office operations.

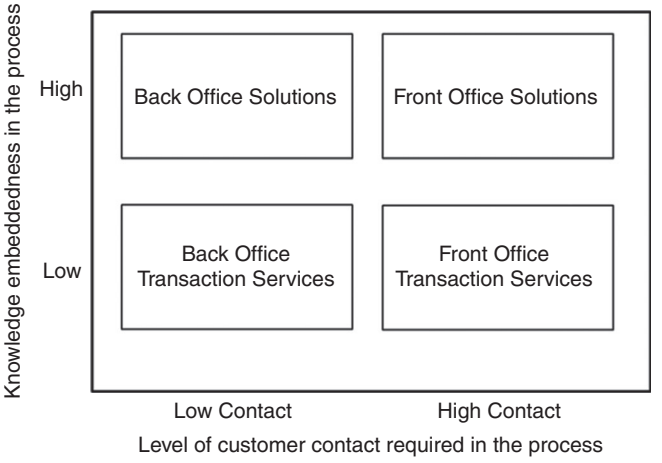
Youngdahl and Ramaswamy (2008) included the level of customer contact and the amount of knowledge embedded in the service operation in their framework, used to analyse offshoring knowledge and service work (see Figure 1. Services with high levels of embedded knowledge are termed solutions, whereas services with low levels of embedded knowledge are called transaction services. Services with high levels of customer contact are described as front-office operations and those with low levels of customer contact are described as back-office operations.

This framework can be adapted easily to other contexts too. For example, the concept of knowledge embeddedness could be replaced by the concept of level of sensitiveness of knowledge. Thus, firms could distinguish between services dealing with sensitive knowledge that potentially cannot be disclosed as such to the customer or that otherwise requires special attention, and knowledge that is openly available to all customers without further escalation. Hence, sensitive requests for knowledge could be forwarded to company back-office operations, whereas customer services dealing with less sensitive company knowledge could be outsourced.

2.2 Strategic role of the plant

The strategic role of the plant model (Ferdows, 1997) consists of six different roles or factory types (see Figure 2): offshore, source, server, contributor, outpost and lead. These factories differ from each other on the basis of autonomy of decision making, autonomy of making agreements, closeness of customers and information.

For an offshore factory, it is essential to be in close proximity to low-cost raw materials and an inexpensive workforce. The main agreements and decisions



Source: Youngdahl and Ramaswamy, 2008

Figure 1. Knowledge embeddedness and service contact

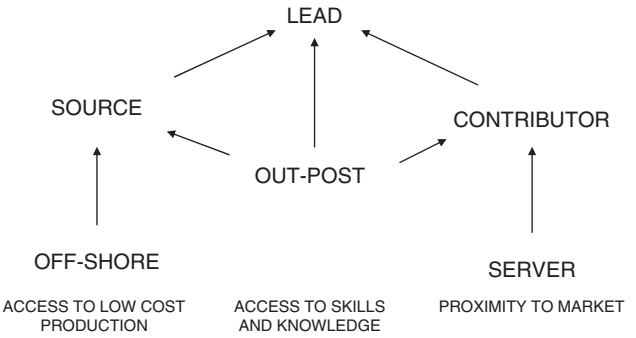


Figure 2.
Strategic role of the plant

Source: modified from Ferdows, 1997

are made at the upper level and the main target for this unit is to produce as cheaply as possible.

A source factory could be depicted as similar to an offshore factory except that it holds its own R&D function. It is located close to a highly-educated but low-cost work force and hence it can undertake various R&D functions for the overall company.

A server factory has the main goal of serving a specific customer market by being located close to it. They can localize their products according to market needs and in most cases language is an important factor as well as the speed of customer services.

A contributor factory takes care of components and subassembly either for a certain market or for the enterprise as a whole. This function is based on economies of scale. When all the components are produced in one factory it becomes cheaper, but this calls for standardization of these components.

The purpose of an outpost factory is to exploit local knowledge and skills for sharing with the rest of the enterprise.

Finally, a lead factory is in charge of developing and rolling out cutting edge products and new solutions for all the markets and production facilities the firm controls.

This model was tested within this study in the service context by applying it to two case companies: IBM and Google. The target was to discover whether this model is applicable in a service context and if so, whether analogous roles within the service context could be identified.

3. Methodology

The case study was chosen as the method of analysis for the following reasons:

(1) the exploratory nature of the research;

(2) the pursuit of new theory building; and

(3) the limited availability of earlier literature on the topic.

Approaching a topic of this kind through a case study is strongly supported by the literature. The case study approach is especially suitable in pursuing answers to questions such as "how", "what" or "why" (see, e.g. Eisenhardt, 1989; Handfield and Melnyk, 1998; Voss, 2009; Yin, 1994).

Voss (2009) points out that case studies are especially suitable when exploration, theory building, theory testing and theory extension/refinement are among the aims of

the research. Voss defines exploration as exposing novel areas for theory building and research. By utilizing cases it becomes possible to discover issues that are in conflict with current theories. Case studies can help in theory building by identifying causal relationships between constructs or discovering the relative importance of different variables. In theory testing, empirical observations are used to justify the theories developed. If the sample size does not allow for statistical tests to be performed, it is possible to use multiple cases instead. Lastly, theory extension refers to the generalization of results. If the developed theory fits together with new types of cases, the results may be generalizable at some level.

The number of cases needed in case research has been discussed (e.g. Voss *et al.*, 2002) but as has been pointed out, this depends on the aim of the study, the depth of observation wanted and clearly the resources available. In case studies involving only one case or a few, the possibility of in-depth exploration is greater, but the drawbacks are the lack of generalizability and the risk of exaggerating the data.

As discussed above, this paper aims to apply Ferdows' (1997) strategic role of the plant model in a service context. By utilizing case organizations in the service context, we examine whether these firms have similar "factory" roles to those common in the manufacturing context. The number of case companies is limited due to the exploratory nature of this study.

Additional information for the study was gathered partly from public sources such as trade journals and partly from interviewing people within the case organizations. When the people were interviewed, they were shown the model as a template and asked to comment on the roles they see within their global or local organizations and how they operate globally.

The use of secondary data have increased considerably in different disciplines (see, e.g. Vartanian, 2011, p. 3), because such data are easily available and inexpensive. The difference between primary and secondary data is that primary data are collected for a specific purpose, whereas secondary data are collected for some other purpose(s). There are several sources, such as National Statistics and government research institutes, which provide free secondary data for research purposes.

3.1 The case organizations

For this study we selected one case organization – IBM Nordic (IBM) – to participate in interviews and we also used secondary data from public sources. Another organization used based on secondary data is Google. At IBM the main source was a senior consult with over 20 years experience in various capacities in Sweden and in Belgium, and he was responsible for services within the whole IBM Nordic.

IBM Nordic is predominantly a service company with over 10,000 employees serving business-to-business clients. It is primarily responsible for the Nordic region in Europe – Denmark, Sweden, Norway and Finland. It has headquarters in Stockholm, Sweden, and a separate legal identity in each country. Google is perhaps the best known company internationally and the service most used in everyday data and information finding.

Cases are usually selected by using various criteria (Eisenhardt, 1989; Yin, 1994). When using few cases, replication logic should be employed. This means that the selection of the cases should be based on the following criteria (Voss *et al.*, 2002): they predict similar results (a literal replication), or they produce contrary results but for reasons which can be predicted (a theoretical replication).

The reason for using IBM Nordic and Google as the two cases in this study is that they both have a great deal of information on their websites and they readily provide information concerning their operations which affords easy analysis. IBM is perhaps the best known and largest computer company which has changed its strategy from hardware to mainly services and succeeded very well. Google is perhaps the best known internet-based service company which started at the beginning of the internet era and is expanding rapidly into multiple areas.

3.2 Benchmarking

Benchmarking became quite well known after the case of Rank Xerox in the late 1970s (e.g. Tucker *et al.*, 1987). However, as the well-known Chinese General Sun Chu (544-496BC) stated, you need not fear the results of a battle if you know yourself and your enemies. That is what benchmarking is all about – knowing yourself and others. Fitzsimmons and Fitzsimmons (2010) defined benchmarking as "the practice of comparing one's performance with that of other firms that are known as best-in-class".

Benchmarking has been used and categorized in many ways, depending on its purpose. Davies and Kochhar (2002) described the models used in benchmarking, i.e. the ideal method model, the benchmarking model and the testing a hypothesis model. Depending on the target organization (Slack *et al.*, 2010) one can also use the concepts of internal or external benchmarking, or competitive or non-competitive benchmarking. The objective can also either be performance levels or the practices used – process and/or performance benchmarking. Prašnikar *et al.* (2005) added strategic benchmarking, which is the benchmarking of competitive advantages on top of process and performance benchmarking.

This study expands the notion of benchmarking by applying a model used in the manufacturing sector – Ferdows' (1997) strategic role of a manufacturing plant – to the service sector. We call this business practice benchmarking because it does not exactly fit any of the previously mentioned categories. It can be argued that it is partly strategic benchmarking, aimed at the benchmark strategies used, or that the target is to achieve competitive advantage, but that is not entirely the case. Similarly, the categorization used by Prašnikar *et al.* (2005) – performance levels or practices used – refers more to best practices. In their Made in Europe studies, Voss *et al.* (1995) and Hanson and Voss (1995) benchmarked the practices used in a manufacturing environment and the relationship between practices and operational performance. By practices they meant the so-called best practices used by companies, such as just in time or concurrent engineering, and not strategic-type business models.

4. Results

4.1 IBM nordic (IBM)

This case is analysed based on the way in which IBM delivers and runs major IT projects.

Server. The task of the local branch offices is to be close to their customers, provide services in the local language and deal with local suppliers in projects. They take care of local liaison tasks and routine-based, standardized services. Depending on the size of the office, there might also be tasks needing deeper knowledge. The portfolio they offer their customers is large, but they can only deliver a certain part of the services themselves. In these cases a project is set up and a contributor runs or implements the project. Similarly, when changes are needed, these services are supplied by the contributor organization.

Contributor. In cases where there is no constant need for certain knowledge or skills, these services are concentrated in certain locations to serve the market better and in a more cost-efficient way. They include high-level project management or advanced IT skills in certain areas such as enterprise resource planning, encompassing systems, applications and products (SAP), etc., and implementation skills.

Outpost. In many cases, new services and solutions are developed together with universities. IBM and many other hi-tech companies are present in Silicon Valley and work in close cooperation with university institutions. Depending on the country, the local IBM office has the role of coordinating these tasks.

Lead. In many IBM countries, there are industry or solution competence centres dedicated to a certain solution and/or industry. Finland is the competence centre for the pulp and paper industry, as well as for icebreakers.

Source. Many services have been outsourced to independent companies in the Far East, although there are still "code plants" owned by IBM or SAP in India. These plants are responsible for standardized software development based on specifications given by the customers – local projects. For this purpose, strict service-level agreements and specifications are needed. These code factories also have their own R&D in order to make the process even cheaper, faster and more lucrative in local projects.

Offshore. Customizations of software modules, 24-hour help desks and Q&A services for customer projects are provided from abroad.

4.2 Google

This case is analysed using secondary data available from public sources.

Server. Local branch offices serve as the first contact points for customers, providing services in the local language and localization services. They also understand the local markets (www.google.fi/about/jobs/locations/).

Contributor. Google Beijing in China is responsible for developing certain key modules of Google's search engines (www.google.fi/about/jobs/locations/beijing/) and the same is true of Google Los Angeles (www.google.fi/about/jobs/locations/los-angeles/) for example.

Outpost. Google has an intensive research program and the entities all undertake a certain amount of research in relation to products developed by the company (http://static.googleusercontent.com/external_content/untrusted_dlcp/research.google.com/fi//pubs/archive/38149.pdf).

Lead. Leading edge solutions are created and tested at the headquarters – as are some other new solutions that currently have no direct link to Google (www.google.fi/about/jobs/locations/mountain-view/).

Source. An old paper mill was acquired in Finland as a location for data servers due to the availability of cheap and reliable energy and easy access to cooling water (www.google.com/about/datacenters/locations/hamina/).

Offshore. Many of Google's locations in the Far East provide cheaper labour for Google's development than would be available elsewhere (www.google.fi/about/jobs/locations/).

4.3 Findings

The results related to IBM and Google are presented in Figure 3.

Based on the case study results, we can see that Ferdows' (1997) model, the strategic role of the plant, is also applicable in the service context. The model needs only slight

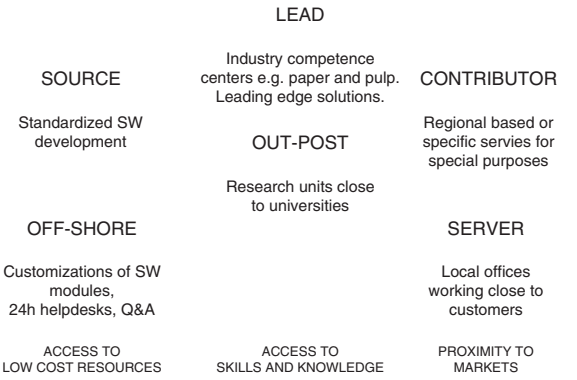


Figure 3.
The strategic roles for IBM and Google

modification for services. The modified model is presented in Figure 4, where the modifications are shown in red and in italics.

As the cases show, the six strategic roles have some special characteristics in the service context and therefore we renamed some of the roles to describe their specific tasks more accurately in the service setting. These special characteristics and the new names given for some of the roles are discussed in relation to Figure 5.

In the service context, a lead location would typically be a centre of excellence for a certain industrial sector, geographical market or service segment; alternatively it could also be seen as a single strategic program management unit for all the service lines of a firm, aiming at creating new processes, solutions and technologies for the purposes of the other service sites of the firm. The outpost role, or agent role, acts in almost the same way in the service context as it does in the product context, as a sort of "agent" for the lead site, for which the key task would typically be to serve clients and to network with competitors and other relevant stakeholders who could provide the firm with important skills and knowledge. More distinct special characteristics were perceived in terms of the source and offshore sites in the service context. They were

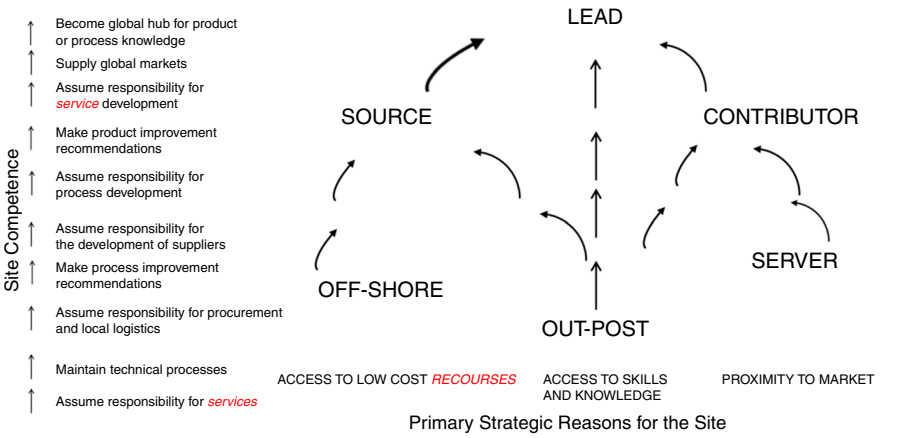


Figure 4.
Strategic role of services

Source: modified from Ferdows, 1997

Figure 5.
Summary of the differences between the strategic roles for products and services

both found to represent non-face-to-face transactional services aimed at the global markets of the firm, source sites being the "success stories" of earlier offshore sites and providing slightly more demanding and customized services than is typical for offshore sites. The contributor and server sites were also found to have a distinctive and different role in the service context. For this reason we renamed them the experimenter and penetrator sites. The finding here was that these roles were seen as the seeking of market penetration and growth in markets with high barriers to entry, or in markets which are otherwise difficult to serve through non-face-to-face services. The penetrator sites seek growth in terms of sales volume and the acquisition of new clients, whereas the experimenter sites go one step further by turning a penetrated market into a test bed for improving the service business and penetrating other similar markets. All in all, these findings constitute a relevant contribution to the current body of research and might prove useful for service business managers.

5. Discussion

By applying the strategic roles drafted by Ferdows (1997) to two case companies operating in a service setting, this paper has shown the power and potential of manufacturing context models when they are used to analyse service businesses. The greatest differences in the site roles were seen to derive from the typical characteristics of services: whether face-to-face service is required or not in order to fulfil customer needs, and the degree of customer interaction required for providing the service to the customer (see, e.g. Youngdahl and Ramaswamy, 2008). The nature of some services is that they can be delivered without face-to-face interaction, such as Java coding, IT support or call centre services; on the other hand, some services require the physical presence of the server and the client, such as advisory services and other more demanding tasks. Similarly, some services require low levels of customer interaction, such as purchasing a meal at a fast-food chain, whereas other services require more input from the customer, such as the investment advice offered by a bank. Among the many other special characteristics of services, these two dimensions essentially change and shape the strategic roles each service site takes (see Figure 5), the key strategic measures against which each site should be incentivized and managed, and finally, the potential for outsourcing (see Table I). By outsourcing/offshoring services, companies seek a variety of benefits. These may include revenue growth, improved efficiency and a focus on core activities. These objectives can only be achieved if the outsourcing/offshoring is designed and implemented carefully (Lewin and Peeters, 2006; Pai and Basu, 2007).

Table I.
Impact of the special characteristics of services on the key strategic measures and outsourcing potential of sites

	Need for face-to-face service	Level of customer interaction	Key strategic measures	Outsourcing potential
Lead	High	High	Innovation and leadership	Low
Agent	Medium	Medium	Innovation	Medium
Source	Low	Medium	Efficiency and innovation	High/medium
Off-shore	Low	Low	Efficiency	High
Experimenter	High	High	Growth and innovation	Low
Penetrator	High	Medium	Growth	Low/medium

The highest potential for outsourcing is naturally in the offshore sites that provide transactional non-face-to-face services. Agent, source and penetrator sites could be outsourced, but each entails some decision-making challenges. For example, if a firm happens to find well-established think tanks or other similar innovation and networking focused entities, purchasing outsourced agent-typical services from them could be a viable option. Similarly, if a firm lacks the knowledge and skills required to enter and operate in a market with high barriers to entry, e.g. in terms of cultural differences, an external penetrator site could be hired to promote the service portfolio of the parent firm and overcome these challenges. A source site could also be hired for similar reasons. On the other hand, if the sites have high strategic importance for the service portfolio of the firm, or if incentive alignment issues arise in terms of hiring external entities, it may be more viable to perform the tasks of these sites in house.

In-house or outsourced offshore sites should be measured purely for their efficiency and costs, agent sites for their input of new skills and knowhow, source sites for both their efficiency and process improvements, and penetrators for the sales volume and new clients acquired. Finally, as lead and experimenter sites are both very important strategically for the parent firm and as these sites offer demanding, face-to-face services for important clients with huge potential for learning and gaining growth, they are certainly sites for which the outsourcing potential is low. Both of these sites should be measured against their innovativeness in creating new processes, solutions and technologies in order to lead the segment in question and provide growth.

Even though this was a case study comprising two cases and therefore the results cannot be generalized, similar roles can easily be found in many companies and organizations. Facebook has recently opened a data centre in Sweden. The location near the Arctic Circle was chosen because of cheap cooling possibilities using sea water and low energy costs which are by far the biggest cost drivers in data centre so this is clearly a source role (www.dailymail.co.uk/sciencetech/article-2054168/Facebook-unveils-massive-data-center-Lulea-Sweden.html, accessed 16 May 2013). Sun Microsystems have a competence centre in Waldorf in Germany just next to SAP headquarters, which is clearly an outpost role with easy access to the core of the development (www.yelp.com/biz/sun-microsystems-global-sap-sun-competence-center-walldorf, accessed 16 May 2013). Many international companies have opened their help desks in India due to the availability of an inexpensive labour force and thus lowering the cost of service, which again is a source role.

6. Conclusion

This main purpose of this paper was to test whether models used in the traditional manufacturing environment can be applied to the service environment. This was accomplished by applying Ferdows' (1997) strategic role of the plant model in the service/solutions environment and to discussing how the model can be utilized in service/solutions businesses.

The research questions concerned whether Ferdows' model suits the service industry and whether the roles can be found and utilized in the service environment. The data indicate that the answer to both of these questions seems to be positive. Judging by the two cases analysed, the model is easy and practical to use. Furthermore, it also prompted interesting discussions. Managers received the model well and it provided an easy springboard for communication. There seem to be opportunities to apply this model in service industry operations.

Although there were only a limited number of examples, the test provided very good insights into the usability of the model in the service environment. However, some

changes and interpretations may be needed from the terminological point of view to make the model and application more understandable.

7. Managerial implications

This study provides managers and business leaders with valuable information concerning the possibilities of categorizing and analysing service operations and thus making them more productive or more valuable for the customer. The cases and examples give above show that it is possible to assign specialized roles to units and thus make the most of a company's international units. Specialization may offer some additional cuts in costs and economies of scale. However, assigning special roles or trying to cut cost is a continuous effort. Offshoring may not always bring the required results, as Immelt (2012) found in the case of GE which has moved outsourced operations back to the USA from China. The conditions at home may change, as has happened in the USA in relation to gas prices and productivity, making it possible to bring operations back home. Furthermore, setting up and controlling the operations may become more expensive as predicted so the labour unit cost is not the only decisive factor.

8. Future research

This study encourages us to go further in analysing the models used in the manufacturing environment and applying them to services. After all, the target is always the same – to increase productivity and make more money for the stakeholders. One good model that could be applied in the future is the product – process matrix developed by Hayes and Wheelwright (1979a, b, 1984). Some attempts have already been made (Apte and Vepsäläinen, 1993), as mentioned earlier, but not on a large scale.

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