

STRATEGY FRAMEWORK FOR POST-CONSTRUCTION CONTRACTOR SERVICES

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In view of UK government strategies concerning the construction industry, there is a need for contractors to reconsider their options regarding the kind of services they may need to offer. Both Building Information Modelling and Government Soft Landings policies imply a shift of emphasis towards contractors providing post construction phase services. By combining a number of approaches to innovation in services, a new theoretical framework, the Pavitt Gallouj Barras model, is devised to assess the capability, capacity and stage of development of any firm as part of its self assessment of its ability to innovate new construction services. The framework is shown to depend on the characteristics of the construction firm or its output and where the firm or its output can be found in terms of its innovation path, its production intensity and its phase of innovation. This a priori research discusses construction performance-based contracting (PBC), and total property outsourcing (TPO) in the light of this theoretical framework. The limitations of PBC and TPO are reviewed and found to be critical in terms of the ownership, control and management of buildings as real estate assets. Both PBC and TPO offer contractors opportunities and incentives to build to higher and more sustainable standards in the long run. By modifying contractors' perceptions of post construction service agreements and contracts, contractors could add value to their output with incentives to build to higher and more sustainable standards. This could herald a shift in contracting culture. However, the conclusion drawn is that although highly innovative, PBC and TPO will only be options for some construction firms, as the additional risks and inflexibility for both contractor and client may be greater than the benefits offered.

Keywords: contractor marketing strategy, performance-based contracting, post-construction management, strategic management.

INTRODUCTION

Ever since Turin (1980), Bon (1989), Ofori (1990) and others, there has been discussion on whether or not contractors provide a product or a service. It can be argued that they provide a product, because developers commission contractors to produce a tangible building by transforming material inputs into a finished physical output. On completion the building is handed over and the contractor's role ends. Alternatively, Ofori (1990) argues that because contractors only assemble the products produced by others, construction is a service. Contractors only provide building services, organising the labour processes, hiring plant and equipment, and managing specialist contractors, subcontractors, materials and components on behalf of their clients. Because contractors bear no commercial risk, only construction risk, they

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provide a service rather than a product up to the moment of completion and hand-over to the developer.

There is, however, no reason why the role of contractors should not be extended the service they provide beyond the hand-over process. Drawing a lesson from manufacturing, where profit margins have been declining, firms have attempted to differentiate their products through additional after sales service provision. This trend has been identified by Salonen, (2011). A similar trend may be emerging at the interface between construction and property management. Profit margins in construction tend to be low due to low barriers to entry, the use of lowest price tendering and the undifferentiated service, contractors are assumed to provide. This can be seen as driving contractors to innovate in construction services.

As part of developing new business models, contractors need to find new ways of adding value to what they already do. This implies that it is no longer always sufficient to provide a finished building at the end of the construction phase. Instead, one option is for contractors to develop new expanded roles for themselves, involving innovative services after building completion. There is therefore a need to establish a protocol that might be used to identify the types of service that firms could develop to diversify and differentiate their offer to clients, improve their services and add value to their existing output. A potentially useful approach to providing new services by contractors is proposed below, though this protocol also implies that there is no one solution that will be appropriate in all cases.

A shift towards providing a service in the form of long term responsibility for completed buildings and structures is equivalent to service innovation by contractors. As discussion of Building Information Modelling, or more accurately, Management (BIM) becomes ever more prevalent, it is anticipated that BIM 5D, which extends the BIM model to include cost management and BIM 6D, which provides detailed building information for use in the post handover phase, will facilitate maintenance throughout the lifetime of a built structure (Rowsett, 2012). In this theoretical examination of the implications of changes encouraged by government through its promotion of BIM, its Soft Landings policy, (BIM Task Group, 2013), and integrated working, a shift of emphasis towards service provision is considered. Although there are many possible options for developing service provision, only two examples are given below. For example, an integrated approach towards the provision of a built structure could take the form of Performance-based Contracting (PBC), which uses a method of specifying a building, according to its function and how it meets the requirements of users over its life, (RICS 2011).

Although very different in nature from construction, similar developments are taking place in other sectors of the economy. For example, Product Service Systems (PSS) are being adopted to focus supply on the requirements and needs of customers and the environment with a view to improving the service provided (Mont, 2002). This after-sales service can include maintenance, repair and replacement of products and is offered in industries ranging from automobiles to lighting and facilities management. Indeed, in construction this kind of approach was adopted in the balanced scorecard of Purchase and Supplier Engineering (PSE) adopted on the Olympics 2012 programme (Mead and Gruneberg, 2013). The balanced scorecard is used to define objectives not only based on the physical structures produced but also extending the aim of a project to meet the client's priorities and needs, whatever they may be.

The outsourcing of component inputs is common practice in manufacturing. Outsourcing of services has also been adopted for many functions inside manufacturing firms themselves, such as catering, security and cleaning, previously carried out by directly employed staff within organisations. It is therefore not surprising to find that outsourcing by firms extends to facilities management and other building services in the US (Kimbler and Rutherford, 1993) and in Europe and North America (Bon and Luck, 1999).

The concept of PBC is that the contractor assumes responsibility for the provision of building services, whilst retaining ownership of the structure throughout the construction phase and beyond. It is the retention of ownership by the contractor that distinguishes PBC from conventional facilities management. In this way contractors offer a complete service to their clients based on the satisfactory performance of the building in use. PBC may offer those providing BIM 6D the framework for conducting a complete service provision, with BIM 6D being the IT means or tool to create a building's technical data base needed to achieve the objectives of a project. This approach would integrate the design, construction and use of a building in a coherent contractual arrangement. Such innovations in construction services by contractors can therefore be seen in the context of different approaches to innovation in services in manufacturing that have been occurring simultaneously with the changes taking place in the construction sector. At this stage this research is purely a priori and no attempt is made here to test the approach empirically. The next phase of research will involve field studies.

The next section develops a model service innovation framework, which combines a number of approaches taken from service innovation literature. Two examples of post construction service are discussed to highlight the inherent difficulties of offering post construction services even before construction has begun. The following section discusses a possible context for implementing BIM 6D using either PBC or TPO (Total Property Outsourcing). We conclude by considering the implications for construction contractors.

The Gallouj, Pavitt, Barras model

Manufacturers enhance their products either in terms of services that support the product, such as repair and maintenance, or those that support the actions of clients, for example, by providing the financing to purchase the product, (Mathieu, 2001). For those firms wishing to introduce innovative services, Gallouj (2002 p1) reports three possible innovation paths or approaches that depend on the characteristics of the economic activity of the firm. The first approach relies on the technological character of the firm. The second focuses on the organisational aspects of the service. The third approach combines both the technology of the supplying firm's product and the nature of the service it provides and seeks to integrate them. Hence, service innovation emerges out of the technology, the service or a combination of both. In construction the technological nature of the firm might lead some into consultancy services, while other firms may have design facilities they could provide as well as providing the components themselves. Other firms may combine the two and design the components they go on to install on site.

Which of these three approaches is adopted also depends on the size of output, the degree of specialisation, the level of technology used and the dependence on bought-in components from suppliers. According to Pavitt (1984) these factors lead to four corresponding types of production intensity. Firstly, scale-intensive firms are those

engaged in mass production. Second are specialised suppliers, whose activities rely on the skills of their workforce, such as mechanical engineering. The third type of firm is science or technology based, such as firms in electronics and green technology. The fourth category is comprised of supplier dominated firms, found in traditional manufacturing and predominant in construction, where the vast majority of small and medium sized enterprises rely on builders’ merchants and other material suppliers.

Production intensity	Innovation paths		
	Technology	Service oriented	Integrative
Scale intensive			
Specialist suppliers			
Science based			
Supplier dominated			

Figure 1: The context of service innovation

Figure 1 is a matrix, combining the approaches of both Gallouj and Pavitt with innovation paths in columns and production intensity in rows. For example, in the technology based innovation path relatively small firms may be dependent on their suppliers and hence supplier dominated. New technology is often outsourced, where the scale of production would not justify investment in new technology. At a slightly larger scale some technological innovation may become viable to undertake in-house. However, even the largest firms often require specialist suppliers to develop particular aspects of their technology. Alternatively, they are able to take advantage of economies of scale that justify investment in their own new technology.

Pavitt’s description of production intensity is developed by Soete and Miozzo (1990), who add a number of types of service firms, namely those dominated by their suppliers of technical systems, (for example, electrical engineering firms), those that rely on networks of transport (such as labour suppliers) or information (architect practices), and those specialist firms that are science-based and innovative (tunnelling engineers).

Innovation of services by firms may be seen as an incremental process, dependent on the stage of a firm’s development. As a firm evolves, it needs to innovate as part of its problem solving activity, providing new services to meet new or changing circumstances over time. Hence, Barras (1986) introduces time and takes into account the growth and development of firms. He suggests a theory of innovation, which passes through three phases. The first phase of innovation concerns improving efficiency, after which the firm moves on to focus on improving the quality of the service delivered and in the third phase it introduces new services. Although Barras (1990) applies these phases to the banking sector, similar changes can be seen in construction, though not necessarily uniformly. The combination of the work of Gallouj, Pavitt and Barras produces a three dimensional theoretical framework of innovation, as illustrated in Figure 2.

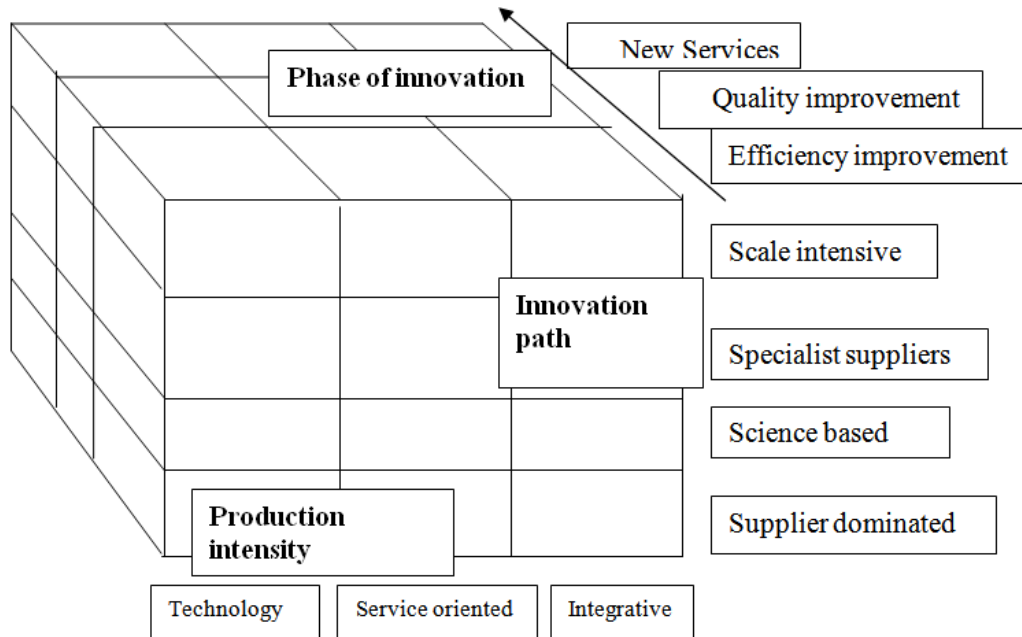


Figure 2: The Gallouj Pavitt Barras model

The three dimensions or vectors in Figure 2 are production intensity, the innovation path and the phase of innovation. This forms a theoretical framework for positioning firms in their service innovation decision making process. Firms can be located in any one of 36 three dimensional blocks in the “Rubik cube” of the diagram by taking each of these vectors into account. However, these three vectors do not take account of some wider market conditions, and further consideration needs to be given to competitors’ behaviour and other external factors that may collectively be called a firm’s business environment. The business environment is included in a model devised by Belleflamme, Houard and Michaux (1986). In their model each economic activity of a firm, V , depends on three elements. The first is production, P , the second is servuction, S , (a term used to distinguish service production from product production) and the third, I , is the organisation of the firm in its business environment. Hence:

$$V = bP + cS + I$$

The coefficients b and c represent the relative importance of production and servuction in the activity. If $b > c$ then the activity is concentrated on providing a product. If $c > b$ then the activity is largely concerned with providing a service. According to Belleflamme et al., this formulation can be used to identify a new good, an improved process of production or an improved process of servuction or a combination of all three.

Performance-based contracting

In construction, PBC is the introduction of a new service, possibly made viable by the introduction of new technologies such as the digital revolution. The introduction of PBC is consistent with Barras’ third phase of innovation as it offers clients an altogether new service. This is reinforced by Gallouj (ibid.), who points out that innovation in services is not the technological change itself but rather the changes in service, which the technology permits as firms learn, adapt and adopt the new possibilities made available.

Applying the approach described by Belleflamme et al. to the concept of PBC, both production and servuction elements are present. The performance of the building may be measured using performance indicators, defined in terms of user requirements. For example, a building may be required to provide adequate ventilation, light and sound insulation, warmth and security and a healthy environment, all with direct measures, such as heat loss or proxy measures, such as user complaints. A service innovation may involve the addition of a new characteristic, such as wireless internet facilities, aesthetics, food and drink provision at certain times of day. Other specifications might include improved traffic flow within a building or improved rest areas and wash room facilities compared to existing facilities. Moreover, the client might wish to convey a successful and welcoming environment for its customers and suitable meeting rooms, in which to transact its business. This could also apply to public sector clients.

A building providing the physical services of PBC may be perceived of as a quasi-good by clients or building users. Gallouj (2002: p 45) defines quasi-goods as devices or capacities placed at the users' disposal. They have two qualities they share with public goods: they are non-excludable in that they are freely available and non-rival insofar as the building facilities remain unchanged although tenants, workers or members of the public make use of them. Examples of quasi-goods include automatic cash dispensers, train ticket machines and information points. Hence, as a result of PBC, a building or a structure, such as a bridge, becomes in effect a quasi-good.

Total property outsourcing

Similar to PBC is total property outsourcing (TPO) but in TPO ownership resides with the developer not the contractor. Nevertheless, TPO extends the role of the building contractor and involves procuring an ongoing service provided by the contractor. The purpose of this is to incentivise the building contractor to consider the longer term issues of a completed building in use.

TPO may be an option, if particular building contractors do not have the financial structure to support the provision of a building as a whole. Alternatively, they may be able to take on smaller packages in TPO. For example, they may be able to provide an on-going service for particular building elements, effectively and efficiently outsourcing specific sub-systems of a building. Similarly, PBC at the sub-component level of construction involves specifying what components are required to do and the most efficient means of achieving the function. As a post-construction-phase service PBC provides suppliers, whether manufacturers, specialist contractors or main contractors, with the appropriate commercial focus to remain responsible for the performance of their components after installation is complete.

From the developers' point of view, if contractors continue to have responsibility for a building or structure after completion, both TPO and PBC may be seen as forms of outsourcing. In terms of property management this may have problematic implications for property owners. According to Gibson and Louargand (2001) outsourcing the property portfolio creates a separation of property asset management from the management and strategic planning of the firm or organisation. This means that the ability to exploit the property market by developers is impaired and the ability to co-ordinate property requirements with the tenant organisation's own plans is reduced. Total property outsourcing is concerned with facilities management, property asset management and property finance. The variety, knowledge and skills

for all of these functions to be adequately covered frequently also require further outsourcing.

Indeed, outsourcing may be used as one method of managing risk. Gibson and Louargand argue that “a key reason for outsourcing is to transfer risks to a third party that can manage the risks more effectively,” (Gibson and Louargand, *ibid.* p50). It follows that there is a need to determine, which aspects of the workplace to outsource and what contractual arrangements to adopt.

DISCUSSION

From the point of view of contractors, PBC is concerned with more than just the delivery of a building or a structure. PBC also involves maintenance and even peripheral functions such as security, cleaning and the total management of built facilities to meet clients’ requirements. The number of skills, technologies, management strategies and business models that are required call for the use of additional sub-outsourced combinations of firms to supply the full needs of clients and building users.

Although PBC transfers certain risks to the provider, the client remains exposed to some extent. For example, even a small delay, caused by the building provider, may cost the tenant client a disproportionately large sum in loss of business, due to disruption, which could not or would not be reimbursed by the provider. In addition the client no longer has direct control over the building or the services that the provider supplies. Moreover, changes in requirements would depend on the negotiating skills of managers but would be dependent on the supplier’s willingness to comply. A further risk to the client is that the business failure of the supplier would not automatically lead to compensation, although the services would still be required by the building users. Moreover, as Lind and Borg (2010) point out, surprises and future problems cannot be fully anticipated in contracts without large contingencies built into them.

In the public sector the agent-principal paradigm applies to the management of property assets, as the cost of construction comes out of the capital account and the maintenance and service costs come out of a separate revenue account. This therefore divides the responsibility for construction and maintenance between different departments and teams within the same ministry.

Because of the durability of the product, public sector managers may expect not to be in the same post by the time problems arise in a building, due to their own career progression and promotion or changes in the administration or even changes in government policy. Therefore public sector decision makers at the initial stages of a long term project, such as a hospital, may deliberately ignore or disregard future costs, which they see as someone else’s responsibility at some point in the distant future.

It is in this sense that game theory plays a part in understanding the motives and incentives for seeking service led contracts (SLCs) in the public sector that offload financial and technical risk onto the private sector. In spite of Lind and Borg (*ibid.*) suggesting that risk in general and financial risks in particular are the main reasons for SLCs, the motive can be more clearly seen in terms of offloading responsibility from individuals and departments onto others, a concept known as moral hazard. As the public sector is comprised of public servants, who are agents rather than principals by definition, an incentive to avoid personal responsibility is always present. This is

because any large costs or losses are ultimately paid for out of the public purse rather than an individual's own capital unless fraud or other irregularity is identified.

Because PBC and TPO carry inherent additional risks, such as those referred to in the previous paragraphs, it is unlikely that whole service provision of a building by contractors would ever become the norm as a widespread method of outsourcing by developers, even given the existence of a BIM 6D model. Nevertheless, PBC and TPO may well become options under appropriate circumstances.

The Gallouj, Pavitt, Barras model of innovation based on the innovation path, production intensity and the innovation phase of the firm may provide a useful framework for contractors, considering the appropriate provision of new services, tailored to their own capabilities, capacity and stage of development. In this way the firm's own relevant characteristics can be taken into the decision making process.

CONCLUDING REMARKS

A general theory of service innovation emerges from the work of Gallouj, Pavitt, Barras and Belleflamme. This fits in well with the changing role of building contractors that may be brought about by the changing use of technology such as IT in the light of BIM, where contractors may need to offer a post construction phase service rather than just a product. This may open the way for contractors to add value to their output and increase their profit margins. It gives them the opportunity to differentiate their outputs by providing distinct levels of service. As long as contractors concentrate their efforts on only competing on price to construct buildings and structures, clients can only resort to selecting the lowest bid on the assumption that there is no need to consider other value adding factors, if contractors only offer to build a final identical product, regardless of which contractor undertakes the work.

Service innovation offers contractors an opportunity to be innovative. Indeed firms would need to become imaginative and find new ways of satisfying their customers' needs. Adopting the theoretical framework reviewed in this paper and adapting the strengths and weaknesses of each firm to meet its own aspirations and commercial aims, PBC could be used with the innovation model suggested here to become an invaluable management tool in the development of new construction services and attitudes towards buildings and structures by suppliers, clients and users.

Using the Gallouj Pavitt Barras model, innovation in construction is likely to take many different forms. Adding post construction phase services is only possible given the financial resources needed to finance them. It makes little sense for small specialist firms to take on functions outside their expertise. It is precisely that expertise that generates their income. Only general contracting firms with adequate capacity would possibly be capable of undertaking PBC but this might well require them to be vertically integrated with a large number of specialist firms. In this way the extension of their services would be accompanied by a restructuring of the firm and the industry, an option only open to the largest contractors. For smaller specialist contractors with skilled labour their ability to provide a diverse service is limited. They may have to offer virtual supply chains.

Whether any of the government's initiatives regarding BIM, Soft Landings and integrated working are successfully implemented by contractors remains to be seen. However, one thing is certain; the use of digital technology is being rapidly adopted, as those of the digital age enter increasingly senior positions. The question is to what

extent the benefits of digital sharing and working can be translated into collaborative working in the competitive and fragmented environment of the construction industry?

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