**Innovation in Servitization through Digital Technologies**

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Abstract

The application of digital technologies within servitization is an emerging phenomenon. Research to date has identified the use of different digital technologies by manufacturers to enhance their servitization efforts, such as the Internet of Things, cloud computing and big data. However, the application of these technologies within the servitization domain has had limited attention using an innovation lens. This is despite digital technologies often resulting in improved or extended service offerings (e.g., remote diagnostics to enhance an existing maintenance service), new service offerings (e.g., an availability offering) or even new service business models (i.e., replacement of a product business model with a service business model). The current study aims to investigate different types of service innovation modes, from incremental through intermediate to radical, with a particular focus on the latter, which is often seen as most important for improving manufacturers’ performance but remains elusive in practice. Due to the limited extent of existing work in this area, case studies are used to investigate the phenomenon, as they facilitate the collection of rich data sets enabling development of academic and practical insights.

*Keywords:*Digitaltechnologies, Servitization, Radical and incremental innovation

**Introduction**

There is growing interest from academics and practitioners about how digital technologies can enhance manufacturers’ servitization efforts. For example, lift manufacturer Otis is using big data and predictive analytics to improve the performance of its traditional maintenance business. The application of these technologies has mainly been considered with regards to their impact on manufacturers’ service offerings, either improving or extending the way in which current offerings are delivered or facilitating creation of new service offerings (Lerch and Gotsch 2015). Some research also suggests that manufacturers may be able to use digital technologies such as cloud computing to transform their traditional product-centric business models towards service-centric models, where services (provision of computing) replace products (sale of computers) (Barrett et al., 2015).

While new digital technologies, such as big data, are often considered innovative per se, research to date has tended to not use a service innovation lens to consider how manufacturers use digital technologies as part of servitization. This is despite the likelihood that an innovation lens, aligned to incremental and radical innovation modes, could help to explain how manufacturers deploy digital technologies and the opportunities and risks of doing so. Thus, the purpose of this study is to investigate, within the servitization domain, different innovation modes using digital technologies. In particular, occurrences of radical service innovations will be purposively sampled and explored as work in this area is scarce despite servitization literature often calling for it.

**Literature Review**

A number of digital technologies are potentially applicable in the servitization domain; for example, the Internet of Things (IoT), cloud computing and predictive analytics (Ardolino et al., 2018). Equally, large complex data sets (often termed ‘big data’) can now be converted into valuable information to enhance competitive advantage (Opresnik and Taisch, 2015). For example, digitised ‘smart’ product-service systems (PSS) are developed through networking and management of connected devices (Allmendinger and Lombreglia, 2005).

Service innovations are often categorised as radical or incremental (Ordanini & Parasuraman, 2011). Service offerings with minor changes to existing characteristics are categorised as incremental service innovation while ones with a new set of characteristics are categorised as radical service innovation (Gallouj and Weinstein, 1997). While innovation is often presented as a dichotomy, it is more likely to be a spectrum, with varying degrees of innovativeness (Story et al., 2014), with incremental and radical modes at extreme ends and intermediate modes in-between. However, innovation level is a relative concept, determined to some extent by the actor concerned, with one company’s incremental innovation being another’s intermediate or maybe even radical innovation.

Within manufacturers, different service innovation modes are apparent. For example, collecting and analysing operational data to enhance maintenance services for forklift trucks (Ulaga & Reinartz, 2011) *(incremental service innovation).* Engine manufacturer Rolls Royce utilising digital analytics and the IoT to create their ‘power by the hour’ service offering (Barrett et al., 2015) *(intermediate service innovation).* A shoe insole manufacturer developing digital products to disrupt existing provider/customer relations (Coreynen et al., 2017) *(radical service innovation).* As previously highlighted, specifying the innovation mode can be problematic since it could be argued that Rolls Royce’s ‘power by the hour’ concept is a radical innovation as the company was the first that offered engine availability as a managed service. Yet, it has not fundamentally changed how the company views itself, which is described as one of world’s leading industrial technology companies (Rolls Royce, 2019); that is, it is still essentially a product company.

Despite the importance of radical service innovation for affecting manufacturer performance (Johansson et al., 2019), there are relatively few documented examples of this being successfully undertaken (Raddats et al., 2019). The exception to this is IBM's historic switch from a computer manufacturer to services and solution provider. Indeed, more recent examples such as General Electric's Predix platform (used to collect and analyse big data) demonstrate the difficulties for manufacturers of monetising digital technologies as part of radical innovations (Sklyar et al., 2019). Manufacturers may have greater difficulties than service companies developing radical innovations since it is not easy for them to ‘break free’ from their traditional product businesses (Burton et al., 2017), thus limiting the extent to which digital technologies can disrupt existing operations.

**Methodology and Potential Contribution**

A qualitative case study methodology is proposed to investigate how manufacturers are deploying digital technologies as part of service innovation. This approach is suitable since there are unclear boundaries between the phenomenon under investigation and the context of the study (Yin, 2017). A number of purposively sampled case studies will be developed highlighting how digital technologies help manufacturers to develop service innovations, using different innovation modes: 1) improve or extend existing service offerings (incremental mode); 2) develop new service offerings (intermediate mode); 3) change the company’s business model (radical mode). One case study will be presented at the conference.

The potential contribution of the work rests on a better understanding of how digital technologies can be deployed in a servitization context. By using an innovation lens, the study will present a novel interpretation of this emerging phenomenon aligned to different service innovation modes. The prevalence of radical service innovations through digital technologies will, in particular, be considered (through having multiple case studies), since these are promised to provide greatest benefits to manufacturers yet remain scarce in practice.

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