Modularity in a Service Context – Does it Hold?

Manufacturers have focussed on producing goods for the purpose of exchange for years. As phenomenon such as servitization and digitization gain momentum, manufacturers are pursuing service models that focus on the customer's context of use. Yet the concept of the service model by manufacturers has largely been seen as separate to their manufacturing model. It is important to recognise however, the two are intertwined as manufactured products often deliver the 'service'. By viewing the two as separate, it becomes clear that the product has not changed, but the life after it has been manufactured has. However, research has shown that this is somewhat paradoxical as it is difficult to scale and replicate service activities because of the design of the product, since it was designed for a different business model (exchange). Instead, firms find themselves relying on employees to attenuate the variety of different use contexts associated with service, which effects viability given the difficulty in scaling and replicating human resources. To overcome these challenges, manufacturers employ modular principles in design and production to attenuate variety, but this is still somewhat paradoxical as modularity necessitates knowing the function/design rules before the product is manufactured. However, service encounters are extremely heterogeneous and cannot be exhaustively known before hand. This means design rules and the associated function cannot be defined during the design and development phases, as the requirement is not yet known, presenting an issue to service providers.

Whilst product architecture and modularity research is well established within the innovation community, little contribution has been made in the field of service. The majority of literature focuses on products with fixed functionality through life e.g., a desktop computer. However, within a manufacturers service model, the products function/use may continually change through life to fit with the customers use requirements. Little research has been conducted to show how customers' emergent needs during the use of the offering effects the products architecture, when the newly prescribed requirements were not designed into the original architecture. By presenting an in-depth, longitudinal case study of a capital goods manufacturer within the defence industry, this paper highlights that existing product architecture and modularity literature may be fundamentally incomplete and misleading for manufacturers pursuing service. The research uses a multi-method approach; including 30 in-depth interviews, analysis of texts, design structure matrix and a measure of the degree of modularity for three armoured fighting vehicles. Our results highlight that modular principles from product innovation do not hold for service innovation, as you cannot pre-define design rules and interfaces for modules you do not yet know are required. It is suggested that in a service context, where requirements are constantly changing post design and manufacture, new research is required.