

Shifting the boundary at which we design and innovate – toward a general theory of modularity in use.

Philip Davies, Irene Ng and Gregory Gibbons, University of Warwick

In examining design and innovation, the individual and their context of use become important elements. However, much research around design and innovation focuses on the design of offerings at the point of exchange as opposed to the point of use. It has been suggested that focussing on exchange has allowed firms to treat consumer practices and value creation as exogenous to the firm (Vargo & Lusch, 2004; 2008). However, this approach leads to shortcomings in that the point of exchange lacks information about the desired outcome and the latent needs of the customer are difficult to serve (Ng et al, 2014). To overcome this, it has been proposed that modularisation of the consumption space and consumer practices could be an alternate mindset for design and innovation (Ng, 2013).

Traditionally, modularity is viewed as a systems concept that partitions a system into distinct portions so that it can be detached and recombined into many different combinations (Schilling, 2000). Modularity has also been viewed from the perspective of transactions, where Baldwin (2008) claims module boundaries create points at which transfers of energy, information and material can occur in their most efficient and cost effective manner. However, many studies of modularity focus on internal design or production processes and how modularity enables a variety of offerings to be made available at the point of exchange, leaving the consumption space and the real needs of the customer exogenous to the system e.g., Ulrich, 1995; Baldwin & Clark, 1997; Salvador, 2007.

Recently, it has been suggested that focussing on value co-creation and viewing innovation as a recombination of resources to achieve a desired outcome is an appropriate mindset for serving context and use (Vargo, 2015) Furthermore, it has been suggested that module boundaries could be identified within the customers' consumption space for the modularisation of their practices (Ng, 2013). We propose, it is at these module boundaries that design and innovation should take place to meet the real needs of the consumer as module boundaries create points at which new resources could be integrated for optimised value creation i.e., the recombination of resources toward a desired outcome. However, the literature lacks both a general theory and a methodology to understand the modularisation of the consumption space and therefore focussing our design and innovation efforts on use and context is increasingly difficult.

We propose a general theory of modularity in use to explain how modularity manifests itself within the consumption space. Within this theory, we identify three modules; input modules, transformation modules and transformed modules. Input modules and transformed modules can be seen as resources (either inputs or transformed outputs of value co-creation) and the transformation module can be seen as context and use, where customers practices are tightly coupled to the resources they have available and the outcomes they wish to achieve. By modularising the transformation module i.e., identifying what practices are required to create a transformed module, firms can identify module boundaries at which they can design and innovate. Thus, design and innovation shifts from exchange to customer practices and use. We will present a case study that tests our theory and highlight a methodology for capturing modularity in use. Furthermore, we will show how this methodology can be used to identify points at which design and innovation can take place within a transformation module (the consumption space). Our case firm will be a multi national capital goods company who designs and maintains military platforms. Within the case study, we will outline how our methodology compliments advances in the digital economy to focus on design and innovation within the consumption space.