

Management PhD Research Topic

The Impact of Product Design on the Designs of Organisations and Industry Structures

Professor Peter Galvin

Abstract

Choosing a modular product or organisational design can have numerous impacts on how a firm structures its operations, where it undertakes its operations (ie the degree to which it can operate different functions across international boundaries), how it competes in the market, the extent to which it diversifies, the rate at which innovation is likely to occur and even the way that marketing may occur through the use of real-time feedback of different product configurations. As an emerging concept, the design principle of modularity may be applied to answer a range of business and corporate strategy, as well as technology management issues. Further details available [here](#).

Detailed Explanation

At a basic level, products can be broken apart into components. The way that these components are organised may be described as modular at one end of the continuum and integrated at the other extreme. A modular design allows components to work together through defined interfaces, thereby allowing organisations to mix and match components. For example, a desktop PC is a modular product as the different components connect together using defined interfaces such as a keyboard will connect via a USB port. A bicycle is a modular product as different brands of wheels can be swapped in and out, a set seat-post diameter means this can be changed and just about all components can be changed easily for another brand of component. At the other extreme, integrated products do not allow this mixing and matching to occur as any change to the product architecture will degrade the performance of the product.

This concept of modular design can be applied to not just products, but to organisations and even to industries. Some organisations may be modular in that certain functions may be located in different locations or potentially outsourced without impacting performance. Integrated organisational designs result in high levels of communication between departments and co-location. Similarly, integrated industries tend to be made up of various vertically integrated firms, whereas modular industries have multiple highly specialised firms that produce individual components that are able function with other components due to the defined interfaces in place. The mirroring hypothesis suggests that there is a correspondence between product, organisation and industry design, ie modular products tend to result in modular organisations and be part of modular industries.

The modular versus integrated design choices have numerous potential impacts and therefore research questions which may form the basis of a PhD research project.

1. When does the mirroring hypothesis hold versus when is it misted? Under conditions of rapid technological change, high levels of product complexity etc it is likely that modular products are developed by integrated organisations. Under what other conditions does the mirroring hypothesis not hold?
2. What impact does the presence of modular organisations and modular industries have upon patterns of competition? If organisations are component focussed and relying upon others within the ecosystem to provide other components required within a product, does this shift the nature of

- competition away from direct head-to-head competition and towards competition for one product design over another, or does competition shift towards different parts of the value chain?
3. How does the type of product design impact upon the type and extent of product innovation?
 4. How, when and why does the product design/architecture (and/or firm designs/architectures) change over time? For example, is there a trend that sees products move towards modular designs and when (and why) does the shift occur in one direction more than others? What drives these shifts?
 5. How does product and organisational design impact the process of internationalisation and off-shoring? To what extent does an operational ecosystem to support shifting certain activities off-shore impact firm's internationalisation decisions?

These are just some examples of interesting research questions that relate to how product/organisation/industry designs impact different constructs. A review of recent journal articles may suggest other interesting potential topics.

Methodologically, most work in this area are detailed case studies of single industries. There are quantitative studies of single industries, but these are less common.

Possible journal articles to build an understanding of the field include the following. A number of the papers are by the lead supervisor to allow candidates to understand his background work in this field. Links are provided where available to the article via the title of the paper.

Brusoni, S., Marengo, L., Prencipe, A., & Valente, M. (2007). [The value and costs of modularity: a problem-solving perspective](#). *European Management Review*, 4(2), 121-132.

Burton, N. & Galvin, P. (2022). [The effect of technology and regulation on the co-evolution of product and industry architecture](#). *Industrial and Corporate Change*, 31: 1056-1085.

Burton, N. & Galvin, P. (2022). [Modularity, value and exceptions to the mirroring hypothesis](#). *Journal of Business Research*, 151: 635-650

Campagnolo D., Camuffo A. (2010), [The concept of Modularity in Management Studies: A Literature Review](#), *International Journal of Management Reviews*, 12(3), 259-283.

Pisano, GP, & Teece, DJ. (2007). [How to capture value from innovation: Shaping intellectual property and industry architecture](#). *California Management Review*, 50(1): 278-296.

Sanchez, R. & Collins, R. (2001). [Competing – and learning – in modular markets](#), *Long Range Planning*, 34(6): 645-667.

Sanchez, R., Galvin, P., & Bach, N. (2023). How design rules emerge and evolve: a coevolutionary architectural perspective on firm and industry organization. *Industrial and Corporate Change*, 32(1), 28-46. [Earlier version of working paper available at: <https://research.cbs.dk/en/publications/closing-the-loop-in-an-architectural-perspective-on-strategic-org>

Sorkun, M. F., & Furlan, A. (2017). [Product and organizational modularity: a contingent view of the mirroring hypothesis](#). *European Management Review*, 14(2): 205-224.

Zirpoli F, & Camuffo A. (2009). [Product architecture, inter -firm vertical coordination and knowledge partitioning in the auto industry](#), *European Management Review*, 6(4): 250-264.