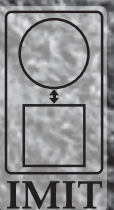


MANAGEMENT

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of Innovation and Technology

**Digitalization and advanced
service innovation**



Digitalization and advanced service innovation

How digitalization capabilities enable companies to co-create value with customers

In the context of increasing connectivity and the omnipresence of information technology in manufacturing industry, adopting digital technologies is changing the very nature of how innovation occurs and the products-services offered by manufacturing companies to their customers.

av Sambit Lenka, Vinit Parida, David Rönnberg Sjödin and Joakim Wincent

Digitalization of manufacturing (e.g. Industry 4.0) is the phenomenon of intelligent connected machines powered by information and digital technologies (Parida et al., 2015). Digitalization offers opportunities for new functionality, higher reliability, greater efficiency, and optimization possibilities that exponentially increases the value that manufacturing companies can deliver to customers (Porter & Heppelmann, 2014).

Manufacturing firms are therefore increasingly adopting digitalization to help themselves provide advanced service solutions (e.g. taking over operational and performance responsibilities or selling "moved tons" rather than a truck). This means investing significant resources in building new capabilities to support digitalization initiatives within their organizations and to maximize the value creation potential that exists in their relationships with customers. However, many manufacturing firms lack an understanding of what constitutes digitalization capabilities and how they can be leveraged to co-create value with customers when offering advanced product-services. To address these questions, the article reports on insights from in-depth qualitative studies involving a number of Swedish industrial manufacturing firms to identify three distinct digitalization capabilities, namely intelligence capability, connect capability, and analytic capability as well as the mechanism (per-

ceptive, and responsive) which enables these firms to co-create value with their customers.

Intelligence capability

Intelligence capability represents the ability to configure hardware components to sense and capture information with low human intervention. A key part of this is to upgrade products with smart sub-components, such as embedded sensors, microprocessors, embedded operating systems, software applications, and digital user interfaces. Accordingly it provides new possibilities to collect information about the condition of the products and the customers' operational usage of the products. For example, Volvo is enhancing the intelligence capability of its machinery that can collect information of total load and other related indicators while in use in large earth moving operations. Such information could provide real-time diagnostics to Volvo who could respond quickly to failures to improve first-call resolution and increase equipment uptime. Thus, intelligence capabilities act as the backbone of digitization and in many cases this is the first step companies take toward digitization.

Connect capability

Connect capability denotes the ability to connect digitalized products through wireless communication networks. A key

function relates to the transmission of information or signals from intelligent products to storage and processing centers in the cloud. This reduces the need for onsite storage and processing, as well as product functionalities, thus enhancing efficiencies and reducing costs. For example, Tesla has developed technology that allows customers to buy and download additional functionalities for their cars when needed instead of having a vehicle with a standard package of features thus eliminating the need to buy a new car with those additional features. In addition the potential connectivity between the intelligent product that could be singular (one-to-one) or simultaneous (one-to-many or many-to-many) opens up new value creation scenarios through greater monitoring, control, and optimization opportunities. For example, a fleet management system could connect numerous intelligent machines to fulfilling customers' overall operational requirements. Thus, without connect capability, dynamic functions and real-time management would not be possible even with a very high level of intelligence embedded in the machines.

Analytic capability

Digitalization results in generating huge amounts of data from intelligent products and networks. To take advantage of the data, firms need to develop strong analytic capability which is the ability to

transform the data available at hand into valuable insights and actionable directives for the company as well as the customer. Analytic capability involves developing rules, business logics, and algorithms that process information or data into predictive insights that have operational value for the organization. Predictive insights help tremendously in the growing, complex, and competitive market to proactively engage with the customers and capitalize on emerging opportunities. In addition, a constant inflow of data from the deployed intelligent and connected products that customers use provides potential to visualize value through simulations based on operational inputs. For example, firms can use simulations in development to customize solutions that best align with customers' requirements.

Value co-creation mechanisms enabled by digitalization

A key finding of our research is that digitalization capabilities can increase interaction among the resources and processes of both the provider and the customer to achieve co-creation of value. Co-creation of value is seen to occur and determined 'in use' through activities and interactions of customer with the provider and its network (McCull-Kennedy et al., 2012). In particular, two broad mechanisms, perceptive and responsive mechanisms, drive this value co-creation process.

Perceptive mechanisms allow the firms

to identify, assess, and address specific customer needs. For example, analysis of intelligent connected product data provides insights on potential opportunities to use the asset effectively. Sharing such information with the customer can help them in taking action to improve both the effectiveness (doing the right things) and the efficiency (doing things right) of the asset in use. Such analysis of connected assets at an operations level can help customers find untapped opportunities for additional value creation. With enhanced virtualization of the product functionalities in the cloud and the potential to integrate digitalized components through a connected network, the firm can customize the solution (offering) configuration and its implementation. Thus, digitalization capabilities can promote continuous auditing of customers' operations and enable manufacturing firms and their customers to work together to reduce process and resource use inefficiencies and improve overall performance as well as solutions that firms can re-configure and align to their requirements.

Responsive mechanisms how quickly and proactively companies react to their customers' changing and emerging demands so that the firms can participate in value co-creation. In a dynamic market environment, the customers face rapid changes that call for quick and effective solutions to help them in their value creation process. Manufacturing firms address

these requirements through virtualized analytics and product functionalities in the cloud, which allow customers to access new or complimentary product functionalities in real-time and with limited downtime. These capabilities also enable multiple installed bases' simultaneous access to functions through a connected network. Virtualized analytics and functionalities allow the manufacturing firms to assess the risks and to deploy functionalities at low marginal costs. In addition, manufacturing firms use digitalization capabilities to develop predictive insights, which enables them to develop proactive value creation strategies. For example, customers can schedule pre-emptive maintenance services on an installed asset base according to the known cycles of breakdowns in machinery or drawing on real-time usage information.

Conclusion: How digitalization capabilities enable value co-creation

Our research shows that digitalization capabilities provide new and untapped avenues for interacting with customers' resources, processes, and performance. Drawing on the value co-creation model of Grönroos and Voima (2013), we conceptualize a framework (Figure 1) that illustrates how digitalization capabilities enable interaction between customers and manufacturing firms. Such cooperation leads co-creation of value in the joint sphere through increasing the breadth and depth of interactions with customers. Breadth of

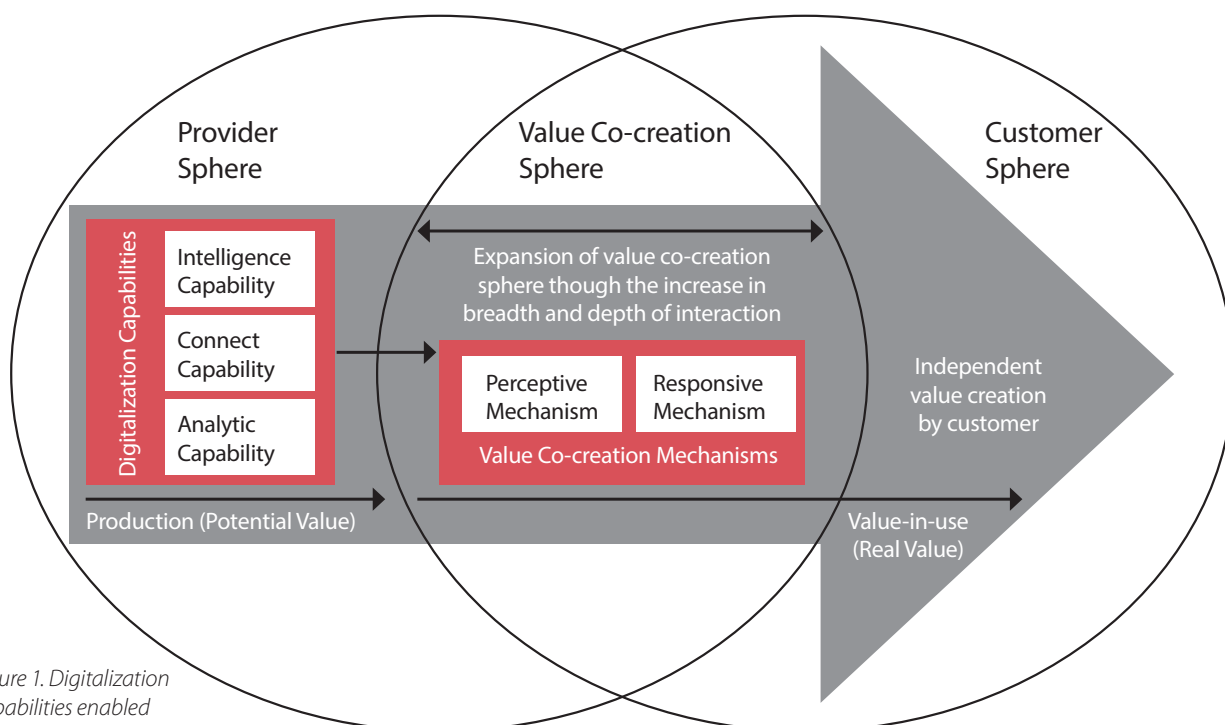


Figure 1. Digitalization capabilities enabled mechanisms for value co-creation

Adapted from Grönroos and Voima (2013)

the interactions increases as the provider starts offering more services and scouts for new opportunities to co-create value on a continuous basis through increased understanding of the customer's sphere. Depth of the interactions increases with establishing closer cooperation with the customer and formation of strategic partnerships through win-win interactions. Therefore, we argue that the development of digitalization capabilities holds possibilities for manufacturing to co-create value with customers and ensure future business development. ●

For more reading connected to this topic please see

Grönroos, C., & Voima, P. (2013). *Critical service logic: Making sense of value creation and co-creation*. *Journal of the Academy of Marketing Science* 41(2), 133-150.

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McCull-Kennedy, J. R., Vargo, S. L., Dagger, T. S., Sweeney, J. C., & van Kasteren, Y. (2012). *Health care customer value cocreation practice styles* *Journal of Service Research*, 15(4), 370-389.

Parida, V., Sjödin, D. R., Lenka, S., & Wincent, J. (2015). *Developing global service innovation capabilities: How global manufacturers address the challenges of market heterogeneity*. *Research-Technology Management*, 58(5), 35-44.

Porter, M. E., & Heppelmann, J. E. (2014). *How smart, connected products are transforming competition*. *Harvard Business Review*, 92(11), 11-64.

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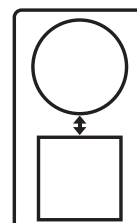
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