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FORSKNINGSINFORMATION FRÅN STIFTELSEN IMIT – INSTITUTE FOR MANAGEMENT OF INNOVATION AND TECHNOLOGY

Ekosystem och plattformsekonomier

Av Martin Sköld

Förändring och digital transformation sammanfattar till stor del årets tredje nummer av tidskriften. Dessa områden ligger också väl i linje med den företagsfinansierade forskarskola där fem doktorander studerar olika aspekter på ledning och organisering av digital förändring. Den forskning som görs kan relateras till tre områden: (1) Nya affärsmodeller - i form av vad som krävs för att erbjuda varor och tjänster med ett nytt digitalt innehåll och hur verksamheten tjänar pengar på digitalisering. (2) Ledning och strategi - hur företag driver den mycket mångfacetterade förändringsprocess och kompetensutveckling som behövs för en digital omvandling. (3) Företagets förändrade relationer med omvärlden – t.ex. leverantörer, kunder och samarbetspartners om hur data får och kan användas och delas.

Den första artikeln fokuserar möjligheter med plattformsekonomier och hur dessa behöver konfigureras med affärsmodeller. Även om det är attraktivt att utnyttja möjligheterna, bör plattformar som går in i offentliga tjänster och starkt reglerade sektorer förvänta sig en rad frågor om legitimiteten i deras sätt att skapa, leverera och fånga värde. Med fokus på digitala hälsoplattformar som exempel på nya plattformsaffärsmodeller fokuserar artikeln på utmaningar som medförs av plattformar. Författarna illustrerar också hur plattformar kan reagera, genom att kontinuerligt och iterativt justera konfigurationen av sin affärsmodell.

Den andra artikeln baseras på en doktorsavhandling som inriktats på AI-teknologins inflytande på affärsmodeller. Forskaren menar att den önskade effekten består i att framgångsrikt införliva AI-teknik genom att föreslå ett tydligt ramverk för AI-drivna affärsmodeller. Omfattningen är industriella tillverkningsföretag som strävar efter att öka digital servitisering inom segmenten business-to-business (B2B) och business-to-consumer (B2C). Forskningsupplägget har bestått i att teoretiskt och empiriskt undersöka hur fenomenet digitalisering, med särskild tonvikt på AI-teknik, påverkar värdeskapande, inom företag.

Den tredje artikeln baseras på en doktorsavhandling som syftar på att utforska hur etablerade operatörer utnyttjar en teknisk förändring för att skapa ekosystem. Avhandlingen bidrar till litteratur om innovationsekosystem genom att beskriva hur en skiktad modulär arkitektur tillåter chefer att organisera innovationsaktiviteter över flera lager. Detta gör det möjligt för tillverkningsföretag att balansera mellan den vertikalt integrerade hierarkin av industriell värdekedja och vertikalt upplösta värdenätverk av digital teknik.

Den fjärde artikeln har intresserats för ”tidsskiften” som möjliggörare för digitalisering. Sådana tidsmässiga förskjutningar gör det möjligt för organisatoriska aktörer att reflektera och ompröva sina historiska och nuvarande sätt att göra saker på och därigenom utlösa innovativa beteenden som bidrar till förändring. Studien visar att chefer och ledare behöver vara medvetna om fyra olika steg för att möjliggöra digitalisering.

Trevlig läsning!

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Adjusting platform business models

— Digital health platforms in regulated industries

Digital platforms are spreading very fast and new opportunities are emerging in the realm of digital services. But, can any firm easily succeed with a new platform business model? Well, reality seems to be quite complex. Focusing on digital health platforms as examples of new business models in highly regulated sectors, we outline the challenges that platforms should prepare for.

By Anna Essén, Javier Cenamor & Johan Frishammar

How to design a *legitimate* business model?

What value does your business offer? How is that value delivered? Who receives that value? Business models answer these and other questions by illuminating how firms create, deliver, and capture value. Business models have become a useful tool for many firms as they can easily represent the key internal components of the firm and its relationship with the external stakeholders. Not surprisingly, management studies and popularized books provide a lot of advice regarding how to design business models. In this respect, designing a successful business model requires a careful consideration of the activities and resources within the boundaries of the firm together with a broad approach to the different actors around the firm, including customers, suppliers, regulators, and society.

Platform business models are a remarkable illustration of the unprecedented opportunities of defining a business beyond the focus on the internal limits of the firm. Companies like Apple and Google have rapidly disrupted entire industries by proposing platform business models based on the value outside their firms, i.e., the network value. By facilitating interactions among different users, platform business models have proposed scalable ways for digital value creation, digital value delivery at minimum cost, and remarkable sources of revenues for their firms (and other firms in their ecosystems). In fact, the external orientation of platform business models allows firms to leverage open innovation and ensure the evolvability of the whole platform ecosystem.

However, every coin has two sides. Besides the unprecedented opportunities enabled by platform business models, their external orientation involves the coordination of a wide diversity of stakeholders, and hence, the adaptation of the platform business models to their different reactions. This aspect is especially relevant in sectors in which the margin of action is constrained by well-established actors and rigid rules, which implies not only high barriers to new entrants but also significant rule compliance after entry is made. As platforms are entering an increasing number of semi- or highly regulated sectors, platform business model designers face new critical challenges. In such settings, the entering platform business models need to become *legitimate*, i.e., accepted, viewed as appropriate, and desirable by professionals, regulators, governmental units, media, and general public. The importance of legitimacy, involving the permission to first enter and the conditions to emerge is evident in our research about digital health platforms in Swedish primary care.

"Netdoctors" entering the Swedish primary care sector

The Swedish "netdoctors", for example Kry, MinDoktor and Doktor.se, deploy platform business models that facilitate interactions between a large number of patients and a large number of medical professionals (e.g., nurses and doctors). A core aspect of their business model is their matchmaking capacity. Sweden has witnessed a steady increase in the number of users (both patients and professionals) since their market entry in 2013-14. In parallel, the "netdoctors" have been continuously debated in media. Indeed, they have been facing a continuous stream of intense discussions, where different dimensions of their business model have been questioned. For example, a popular topic in media was whether the target users of the "netdoctors" even needed primary care.

Our research studied how their business models evolved in relation to legitimacy debates. Our findings specified the different dimensions of their business model that were questioned over time, resulting in a set of adjustments among the Netdoctors, across three phases. The major questions and adjustments made are outlined in Table 1 (next page).

In the early stages of the studied platforms' life cycles, legitimacy debates concerning *platform-service feasibility* triggered business-model redesigns aimed at demonstrating both need and usefulness. Subsequently, the mobilization of demand following these adjustments elicited new legitimacy concerns about *platform-service integrity*, which prompted business-model redesigns to broaden the scope and formalize online delivery. Finally, legitimacy debates concerning *platform-service recipients* impelled the platforms to focus on diversifying and integrating online and offline services to demonstrate the broad societal relevance of their services. These insights underscore that value creation, delivery, and capture mechanisms of the business model must change over time. Specifically, our findings point to the critical business-model decisions and legitimacy debates that new entrants need to take into consideration at the different phases of their entry into non-platformized sectors.

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Target of concern	Concern/question raised	How platform firms responded
Platform service feasibility and relevance	Is the service providing value in digital form - can care occur 'online'? Is the need addressed relevant? (*value creation*) Is the technology applicable in this service context? (*value delivery*)	Demonstrating need and feasibility by: – Mobilizing users and highlighting demand – Focusing on low complexity application – Focusing on basic and common needs
Platform service integrity	Is the medical quality of the service sufficient (*value creation*) Is the privacy/confidentiality issues handled appropriately? (*value delivery*) Should the service be subsidized? (*value capture*)	Broadening scope and formalize online delivery by: – Enhancing process transparency – Adding new revenues sources – Expanding into new basic and common segments
Platform service recipients	Is the service only benefitting a small share of the population? (*value creation*) Is the platform able of providing integrated and continuous services (*value delivery*) Are payment models impacting the remaining public service system negatively? (*value capture*)	Diversifying and integrating online and offline services – Experimenting with different ecosystem positions and payment models and targeting new populations by moving towards omnichannel strategy

Table 1. Concerns and responses related to specific dimensions (value creation, delivery, and capture) of new platform business models in Swedish primary care

Implications for designing *legitimate* platform business models

Platforms should expect a wide range of legitimacy challenges when entering regulated and non-platformized settings. These challenges must be managed proactively and continuously. Based on our research, we present some suggestions:

• Analyze the specific needs for what should be changed

Different dimensions of the platform business model (value creation, delivery, capture) may be the target of concerns at different points in time. Platforms should therefore focus on the dimension(s) of the business model that is in need of adjustment at each point in time and to communicate that proactively to stakeholders.

• Do not forget the whole picture

Platform business models combine intertwined components. This means that each change may result in adjustments in the other components. It is fruitful to keep in mind how these adjustments may affect the whole business model.

• Orchestrators may be preferred to dictators

Platform business models allow firms to "manage" external relationships with different stakeholders. This means that the external parties have their own interests and margin of action. Respecting the heterogeneous motivations and the decision power of the different stakeholders may benefit the evolvability of the platform business model.

• Adapt or perish

Platform business models are not static, especially for entering new markets. Adaptations may trigger new concerns. For instance, in our case, the move to omnichannel created new concerns about offline capabilities. Hence, a continuous redesign and adjustment is needed.

RECOMMENDED READING:

> Essen, A., Frishammar, J., Cenamor, J., 2022. Entering non-platformized sectors: The co-evolution of legitimacy debates and platform business models in digital health care. Technovation 102597. https://doi.org/10.1016/j.technovation.2022.102597

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AI-based offerings

— a value process framework

As a technology entrepreneur and a practitioner in the industrial manufacturing industry in various technology roles over the last two decades, I have seen various technology phases such as the dot com, Internet, e-commerce, IoT, cloud, Industry 4.0, and AI phases. I recall that adopting every major new technology has been far from easy for industrial manufacturers, with AI being no exception. The adoption of AI in offerings from industrial manufacturing organizations remains low. While the impact of AI on the world economy is well under discussion, with potential contributions as high as USD 15.7 trillion by 2030, AI arguably brings about substantial opportunities and challenges for many industrial manufacturing companies.

By Girish Agarwal

In my recently defended doctoral thesis "Revising Business Model Innovation: Towards a value process framework for AI-based Offerings" I have explore AI technology's influence on the value processes within BMs, thereby fostering insights into the impact of AI on both efficiency and more fundamental value changes in BMs. The desired effect is to help industries successfully incorporate AI technology into BMI activities and the resulting offerings. This is achieved by proposing a tentative framework for value within AI-driven BMs. The scope is industrial manufacturing companies aspiring to increase digital servitization in the business-to-business (B2B) and business-to-consumer (B2C) segments. The research approach was to theoretically and empirically investigate how the phenomenon of digitalization, with a particular emphasis on AI technology, impacts value creation, delivery, and capture within a company's BMs and BMI efforts.

AI technology and Business Model Innovation

AI technology is typically thought to allow new production methods with a more limited or changed role for human workers. Such technologies do not replace today's production systems but are implemented in existing systems to reduce cost, limit risk, or take over work processes that are dull or dangerous for people. In this way, implementing new technologies is associated with process innovation carried out by the workers, which means doing the same thing but in a much better way and thereby increasing efficiency through data-driven automation and other techniques. There is a significant risk that this production view is far too narrow and should be complemented with technologies utilized for innovation, with the resulting consequences representing value for all stakeholders within the ecosystem. The thesis highlights that AI is commonly treated like any other technology, enabling new functionality or performance today. In this view, AI technology would not benefit adopting customers and users unless it can be used purposefully to create new value that is distributed to stakeholders with accepted or new business models (BMs).

In current theories of BMI and value together with the impact of AI on BMI and value, there has been a lack of process aspects in the discussion of value in digital BMs. Furthermore, it is also observed that AI is improving efficiency, helping implement servitization-based BMs, and enabling new ways of creating and sharing value for customers around the existing BM value processes. On the other hand, AI is creating new value processes within BMs. Therefore, we need to reconceive or modify our current conception of value processes in BMI to understand these new value processes. Hence, to accelerate the incorporation of AI within industrial manufacturers through a better understanding of the value in digital BMI, a process-dri-

"There is a significant risk that this production view is far too narrow and should be complemented with technologies utilized for innovation, with the resulting consequences representing value for all stakeholders within the ecosystem."

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”Overall, the lessons learned from this research can bring clarity to top management within Swedish companies about what to do and how to drive the digital transformation agendas of companies into the area of new digital technologies, AI, and BMs.”

ven value theory of AI-driven BMs has been developed by proposing a framework for value dynamics within digital BMs.

A process perspective on AI value

The research resulted in a proposed AI value process framework for business modeling. It is a practical tool that managers can use when designing and evaluating BMI. The framework is simple, practical, and valuable for clustering, managing, and monitoring value in AI-technology–driven business offerings. The framework can be applied in agile development, iterating the fundamental process of value identification, manifestation, and capture as we explore, introduce, and enhance AI-driven data services and offerings. The proposed value dimensions not only optimize the service offering as such over time but do so at a reasonable level of risk for each project and offering in terms of its value. Also, it drives organizational learning in each iteration, thereby supporting the overall BM value. The proposed framework also helps practitioners with their BMI activities by applying AI technology to realize different value processes in action. For example, AI technology can enable new value-capture strategies such as the dynamic pricing of offerings by helping quantify value, and the exact value quantification can help resolve value dissonance between stakeholders. The framework can be applied to various value process dimensions themselves, such as linking value identification to business strategy, capturing data for indications of value adaptation during value manifestation, and hypothesizing the next iteration during value capture, but also to the interface between dimensions, such as creating data touchpoints and making objective decisions based on data predictions.

During this research, various case studies revealed multiple AI-enabled capabilities, and concepts such as hyper-personalization surfaced, which could prove useful in producing competitive advantage. For practitioners, this research stresses that to be relevant as service suppliers, companies would benefit from increased use of big data and AI in customer solutions and from the use of tools for understanding customer value such as VoC and design thinking. Findings of this thesis substantiate the need to consider the phenomenon of value changes in customer perception within BM design for better continuous value creation, delivery, and capture and better adoption of servitization.

Value Dissonance

Another observation from the research studies is that companies are still relatively early in their journey towards adopting complex digital offerings. They face value dissonance and see values differing completely from those anticipated from the offering, when compared from the initial exploration to final industrialization phases of the concept. It is therefore crucial to emphasize value identification within BMI. The relationships and roles of an ecosystem's channel partners are evolving and need to be defined by incumbents to make them more inclusive within the value-identification process by involving them early in the firm's innovation process. If we can understand the impact and role of AI technology regarding perceived customer value obtained through the digital offering and other transformed value components, organizations would gain better insights when creating such digital service offerings. This would further help firms appropriate value to their customers and partners within the ecosystem of which the digital offering is part. The findings show that the perceived value of services varies significantly at the level of the individual customer throughout the service lifecycle due to conditional, social, emotional, and epistemic aspects. The observations also indicate end customers' overall perceptions of the value of these offerings. Customers should be segmented and targeted using the innovation and risk-taking traits in their characters rather than other functional traits of the offerings, as has traditionally been the case in product-based offerings.

The importance of individual risk-taking and innovativeness

The results from the research highlights that an individual's risk-taking ability and innovativeness are vital for his or her value perceptions. It has important organizational implications for AI technology adoption, that usage of AI offerings is

based on how innovative and risk-taking individuals are, and this fact can be applied when companies design their offerings. This is an essential insight from both an internal organizational perspective and an external offering design perspective. The internal organizational implication is that the design and offering of AI-technology–enabled services should combine the currently uncoordinated functions within firms taking care of products, services, and contracts. It also highlights that the success of AI-based offerings depends not only on combining the operational and strategic approaches within a single department, but also on interdepartmental cooperation, which calls for new organizational structures. The implication for external offering design is that packaging and branding messages for AI-based offerings should target risk-taking and innovative customer groups for better stickiness.

What companies should do

Overall, the lessons learned from this research can bring clarity to top management within Swedish companies about what to do and how to drive the digital transformation agendas of companies into the area of new digital technologies, AI, and BMs. The collective findings can engender additional insights into setting the strategic course of Swedish companies on a global scale and help us understand the needed magnitude of change, future investment levels, and risk-taking to successfully navigate this industrial revolution. This will help the Swedish companies sustain their competitive advantage in digital business models and AI. Companies should use AI technology within the business model to impact value rather than just creating functionalities and features. They can use AI technology within the business model as a "ladder of innovation" with three steps.

STEP 1: "AI FOR EFFICIENCY": This is primarily the current business view of AI technology as a resource with implications for business productivity and efficiency gains. This step of AI innovation is very relevant to various industries, and it employs various use cases of AI-driven functionalities and features; for example, intelligence and intelligent products and services are created using advanced analytics and pattern recognition—i.e., better quality through prediction and anomaly detection. Regarding automation using vision-based solutions rather than static programmed robotic solutions, applying AI in such use cases highlights a good use of technology to increase efficiency in different parts of a BM, such as manufacturing, operations, supply chain, and marketing.

STEP 2: "AI FOR CUSTOMER VALUE" In this view, AI technology can be used not only as a resource for improved efficiency but also as a capability for building competitive advantage within BMs. More emphasis can be placed on customer and stakeholder values rather than just on the functionalities and features of products and services. This can create new value through AI technology, value that was not previously possible in the BM offerings of organizations. To illustrate a few, AI enables capabilities such as self-learning, optimizing solutions based on individual customer interactions with the offering, and dynamic pricing that can be adjusted based on actual value perceptions over the contract period. Creating hyper-personalization and mass-customization opportunities in offerings to create value in different parts of the BM is enabled by AI technology.

STEP 3: "AI FOR INNOVATION" In Step 3, AI technology enables constant change in new value creation and value relationships that were not previously possible by taking a dynamic capability view of AI technology within BMI. This dynamic capability can even create new options within BMs through the insights generated by advanced analytics and AI technology. For example, AI technology utilizes a continuous data stream from customer touchpoints and offerings to understand today's customer experience. It then outlines possible future enhancements of the offerings that can take the current customer experience to the next level. Step 3 can also enable new relationship value generation by including other BM stakeholders, combining their experience and datasets to create new value offerings and BMI relationships with the business stakeholders.

RECOMMENDED READING:

> Agarwal, G. (2022). Revising Business Model Innovation: Towards a value process framework for AI-based Offerings(Doctoral dissertation, KTH Royal Institute of Technology).

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Innovation ecosystems & industry 4.0

— Leveraging technological change to create ecosystems

By Gouthanan Pushpananthan

In today's digital economy, the boundaries between the physical and digital are disappearing and innovation is no longer a firm or industry specific activity. In this context, the concept of an ecosystem has become a powerful analogy to explain joint value creation where actors from multiple industries, including competitors, co-create value.

Value creation in ecosystems

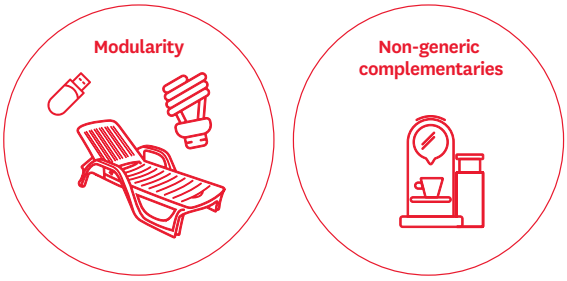
Big data, distributed processing, cloud computing, etc. have led to the convergence of the digital and the physical in the industrial world and has altered the competitive dynamics of industries. For firms developing hardware products, industry 4.0 demands integrating IoT-based technologies to physical products. In contrast to physical products, digitized products (such as smartphones and autonomous vehicles) are characterized by generativity and continuous creation of value based on the ability to allow users to access and consume other digital products and services. Subsequently, manufacturing firms are increasingly interested in understanding the underpinning of value creation beyond industry and organizational boundaries.

Management scholars have increasingly adopted the notion of "ecosystems" to explore value co-creation in distributed networks. The term "ecosystem" embodies a system in which diverse members co-exist in mutually dependent relationships. In business and management literature, scholars have identified various types of ecosystems including, among others, innovation and entrepreneurial ecosystems. Interactions within an innovation ecosystem (IE) are typically organized around a technology platform consisting of shared assets, standards, and interfaces.

Several scholars describe value creation and capture in an ecosystem, but few explore the process of ecosystem emergence. This is particularly problematic for industries facing disruption due to digitalization. Managers and entrepreneurs struggle to understand the microprocessors that underpin the emergence of a new ecosystem. Also, most studies on ecosystem focus on well-established and mature ecosystems (such as Apple's iOS and Google's Android). Furthermore, the studies have largely focused on software or technology firms operating in digital ecosystem. There remains a void in our understanding of innovation ecosystems involving firms from industries such as banking, healthcare, and automotive industry.

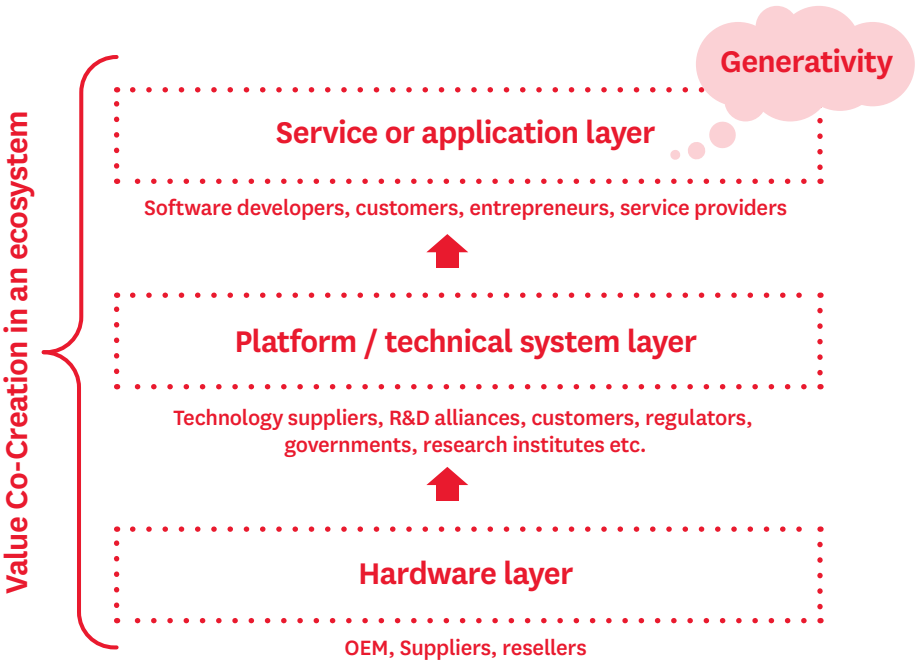
Layered Modularity and ecosystem emergence

Innovation ecosystem researchers acknowledge that 'modularisation' (i.e., breaking down a complex product or system into independent modules) and 'non-generic complementarities' (i.e., assets that complement one another in a confined way) are important underpinnings of an ecosystem. For instance, Nespresso transformed the generic complementarity between coffee and coffee machines and transformed it into a 'non-generic complementarity' by designing capsules (or pods) and specialized machines for the capsules. Thus, firms that develop modular products with non-generic complements can create ecosystems. Modularity enables the building of complex products and systems, based on independent sub-systems. Complementarity implies that the two assets are unproductive unless they are used together, and non-generic complementarities means that the assets are specific rather than generic.



However, not all modular products (or platforms) develop into successful ecosystems. Further, incumbent firms in traditional industries are accustomed to operating in linear value chains with hierarchical organizing logic. With advancements in Information and Communications Technology (ICT), the organizing logic is moving away from integrated architecture, with one-to-one coupling between components, towards modular architecture with standardised interfaces.

My thesis contributes to scholarly discourse on innovation ecosystems by explaining the transition of an incumbent firm's internal platform into an 'external' modular platform. The resulting modularization highlights an important distinction between modularity as understood in the traditional product development literature and modularity needed for



the "emergence" of an ecosystem. For instance, traditional industries use modularity as way to "outsource" and/or reach "economies of scale". However, the modularity that allows the development of ecosystem should facilitate value co-creation, and allow actors to both cooperate and compete.

Incumbent firms in traditional industries are accustomed to working in industrial value chain where they reduce or eliminate competition amongst the actors in the value chain. In the digital era, this is seen as stifling innovation and limits start-ups or new ventures to enter the industry and promote new products or services. In my thesis, I touch upon this conundrum by showing how industrial actors can embrace ecosystem innovation through a "Layered Modular Architecture" (LMA). By studying various activities undertaken by an incumbent manufacturing firm, during a discontinuous technological change (DTC), the thesis describes the concept of LMA as a design mechanism to support generativity, which means that value is continuously created through unexpected combinations and unpredictable innovations.

In addition, ecosystem scholars do not explain the capabilities needed for incumbent manufacturing firms to orchestrate an ecosystem. My thesis makes contributions associated with the capabilities needed to orchestrate an innovation ecosystem. Previously, manufacturing firms used their manufacturing capabilities, resources, etc. to establish their position in the value chain. This thesis proposes three keystone capabilities – cooperation, coordination and competition capabilities – that are important for orchestrating an emerging ecosystem

Conclusion

The purpose of my PhD thesis was to explore how incumbents leverage a technological change to create ecosystems. The thesis contributes to literature on innovation ecosystem by describing how a layered modular architecture allows managers to organize innovation activities across multiple layers. This allows manufacturing firms to balance between the vertically integrated hierarchy of industrial value chain and vertically disintegrated value network of digital technologies.

As physical products transition into platforms, it is making value creation more difficult. Incumbent firms, especially from manufacturing industries, possess organizational capabilities related to their resource base, intellectual assets and hierarchical industry structure. The future of industrial production involves not just developing physical products and related services. In contrast to physical products, digitized products (such as smartphones) are characterized by generativity and continuous creation of value based on the ability to allow users to access and consume other digital products and services.

This thesis proposes the idea of layered modularity as a mechanism to support development of digital technologies. With developing the physical product (such as a car or a camera), the incumbent firms can innovate within their existing hierarchies and traditional development methods. To develop digitized functions and features, managers can leverage the device (or hardware layer) to integrate software and technologies created by heterogenous firms, thereby intertwining a range of innovation trajectories.

RECOMMENDED READING:

> Pushpananthan, G. (2022). Becoming a Keystone: How Incumbents Can Leverage Technological Change to Create Ecosystems (Doctoral dissertation, Chalmers Tekniska Hogskola (Sweden)).

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Time for Change: How Temporal Shifts Enable Digitalization

By Sofia Pemsel & Jonas Söderlund

How do organizations change? This is a puzzling question that research and practice have been grappling with for decades and clearly a central question for a number of research projects among IMIT fellows and partners. Indeed, we know quite a lot about change – and how successful change is facilitated. We know what some of the most common mistakes are, and we know what the most important success factors are. That said, there are some factors that are more intriguing than others. Recently we have started to become increasingly aware of the close relationship between time and change – that time may in fact trigger change, and that time in itself is a central issue to change. This is, for sure, a difficult, but at the same time essential challenge that requires new theorizing around change and innovation. In particular, we need to know more about the actual speed of change, the right rhythm of change activities, the right sequence of change activities, and the best timing of change activities. In a recent study we set out to explore some of these issues in more depth.

This study shows that deliberate rhythm changes, so called temporal shifts may provide a new understanding of change. Such temporal shifts enable organizational actors to reflect and rethink their historical and current ways of doing things – and thereby trigger innovative behavior that contribute to change. What then are those temporal shifts and what role do they play in change?

Every organization has its own internal rhythm of how and when to do things with regards to frequencies, sequences, durations, and timings of activities – when shall things be done, for how long and in what order? An organization has its hidden rhythms that everyone interested in understanding that organization needs to uncover. From a scholarly point of view, such rhythms form a diverse set of temporal regularities that constitute an organization's temporal order which can be extremely challenging to change as they are often highly institutionalized and deeply engrained in various organizational practices. More so, the temporal order is a key element of the organizational culture and capabilities. The temporal order may both enable and hinder organizational change yet simultaneously offer cues for anticipating organizational change. Understanding the temporal order, this study demonstrates, seems particularly important when organizations change and embark on initiatives to digitalization.

Changing times for digitalization

Digitalization is often associated with increased speed, things that before took weeks can now be done in a few seconds, only with a few "clicks" on your computer. Design of architecture and new product development are only two out of many operations where digitalization has meant increased speed. For example, Building Information Modelling (BIM) demark a shift in speed of design practices decades ago, but our digital models still advances and with that open, not only for new ways of designing, but also new ways of collaborating and coordinating work as well as new ways of operating and maintaining the product throughout its lifecycle. Digitalization may so enable processes to go faster, things to be done simultaneously with a higher frequency. Finding the right timing of when to do certain things hence is different from non-digital practices, which can cause abnormal, ambiguous, and uncertain situations for the actors involved in the design process. Digitalization hence requires a change of our temporal orders and our time horizons, if implemented wisely and is not met by heavy resistance.

Temporal shifts as enablers for digitalization

Research shows that temporal shifts enabled the implementation of digitalization in a large-scale construction project. The project's ambitions were innovatively demanding with a challenging deadline. The project team quickly realized they would never be able to meet their deadlines with current pace in design - the project task was too complex, too large, and too tight timewise. The project team assigned a digitalization team with the task to develop and implement a novel digital tool in the project. Since the novel tool was cutting edge it required novel practices that would break with the design people's current knowledge horizons. The project director appreciated this new tool would require a fundamental change and support structure around the designers, there were no time for people

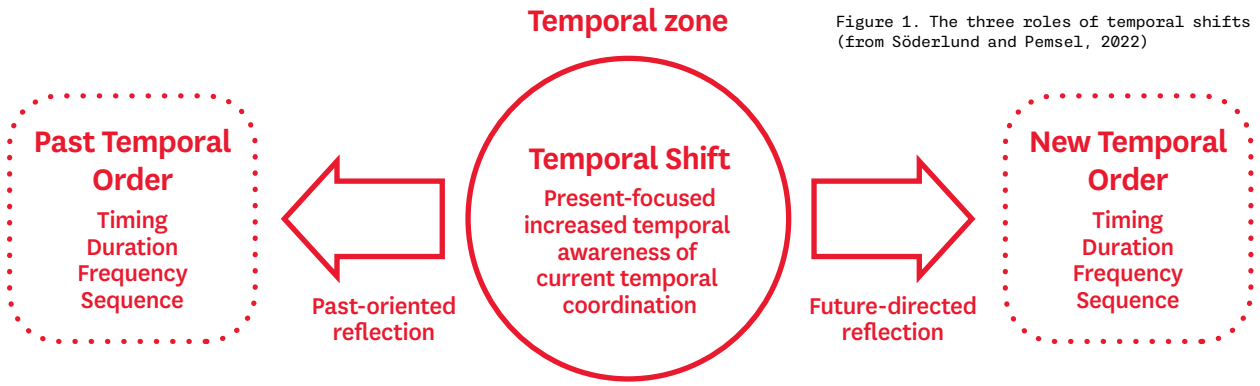

Figure 1. The three roles of temporal shifts (from Söderlund and Pemsel, 2022)

doing things wrong or refusing to adopt it. Time was ticking. The project director implemented four core initiatives to support digitalization:

1. The digital team was given equal level of authority as the designers. Normally the designers were ranked above the digital people. But here the digital team was empowered to send home designers that refused to adopt the new digital tool and design practice.
2. Implementation of three novel digital roles: model managers, content managers and equipment managers with the task to teach, control and support the designers.
3. Implementation of novel design practices of when and how to design
4. Implementation of "No design time" when the designers were not allowed to design since the digital people had to check and prepare drawings on a weekly basis. This was a very controversial new practice since the designers were used to design until the very last minute before delivery.

These four new practices met some resistance, uncertainties, ambiguities among the designers, but through persistent work by the digital team, it paved the way for a temporal shift – and aa rhythm change in the project around how and when to do certain things. The temporal shift enabled the rhythm change by: (1) making people aware of how they have historically done things and what problems they are now facing, (2) making people more aware of how their own actions influence others, and (3) the temporal shift made people more aware of how their current actions should be adapted to face future challenges and requirements (see Figure 1).

Managerial implications

The project under study here played a key role to make change happen. The project demarked a bracket in time with its clearly defined deadline and supported by a temporary organization set up to deliver the project. This was evidently fundamental in giving participants an understanding of the need for and direction of change. The project as such was vital to harbor the temporal shifts and moreover give the rhythm change legitimacy among the project actors. This is an important managerial implication – understand the different ways to harbor temporal shifts and thereby facilitate change. In addition, our findings indicate that managers need to be aware of the following steps:

1. IDENTIFY THE TEMPORAL ORDER in the existing organization. Get a grip of the "right" (current practices) concerning durations, sequences and timings of the practices in need to be changed. What are the legitimized rhythms in practice in the organization?

2. DESIGN THE RHYTHM OF THE CHANGE EFFORT and future practices.

3. CONDUCT A COMPARATIVE TEMPORAL ANALYSIS between the current organizational rhythm and the change rhythms to get an understanding of how and why actors might start resisting the change analyze.

4. SUPPORT THE TEMPORAL SHIFT by implementing new roles, support functions and authorities to bridge potential temporal resistance. For example, make people reflect about the current temporal order and how it needs to change to better fit the new requirements of the situation and perhaps the future. That is, ensure the temporal shifts make people reflect about past, present and future to create a collective understanding of where to move and why.

RECOMMENDED READING:

> Söderlund, J., & Pemsel, S. (2022). Changing times for digitalization: The multiple roles of temporal shifts in enabling organizational change. Human Relations, 75(5), 871-902. https://doi.org/10.1177/0018726721991623

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