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Viability Mechanisms in Market Systems: Prerequisites for Market-Shaping

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Structured abstract

Purpose

This paper develops a conceptual framework based on the identification and examination of the mechanisms (termed "viability mechanisms") under which market-shaping activities yield the emergence of a viable market: one able to adapt to the changing environment over time while remaining stable enough for actors to benefit from it.

Design/methodology/approach

The paper employs extant literature to build a conceptual framework identifying viability mechanisms for market shaping and a case illustration examining how a viable market for Finnish timber high-rise buildings was created. The case exemplifies how the identified viability mechanisms are practically manifested through proactive market-shaping.

Findings

The proposed conceptual framework incorporates four viability mechanisms identified in the extant literature: presence of dissipative structures, consonance among system elements, resonance among system elements, and reinforcing and balancing feedback loops. It illustrates how these mechanisms are manifested in a contemporary case setting resulting in a viable market.

Practical implications

First, firms and other market-shaping organizations should look for, or themselves foster, viability mechanisms within their market-shaping strategies. Second, as failure rates in innovation are extremely high, managers should seek to identify or influence viability mechanisms in order to avoid premature commercialization of innovations.

Originality/value

This research identifies how these viability mechanisms permit markets to emerge and survive over time. Further, it illuminates the workings of the non-linear relationship between actor-level market-shaping actions and system-level market changes. As such, it provides a "missing link" to the scholarly and managerial discourse on market-shaping strategies. Unlike much extant market-shaping literature, this study draws substantively on the systems literature.

Keywords: Market-shaping, markets-as-systems, systems theory, viability mechanisms, case study

Article classification: Conceptual paper

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Introduction

Practitioners and academics are recognizing proactive market-shaping as an important strategic approach to addressing an increasingly unpredictable business environment (cf., Harrison and Kjellberg, 2016; Kindström et al., 2018; Nenonen and Storbacka, 2018). Marketing studies discuss the market-shaping phenomenon under various headings including "proactive market orientation" (Narver et al., 2004), "market-driving strategies" (Jaworski et al., 2000), "market scripting" (Storbacka and Nenonen, 2011b), "market innovation" (Johne, 1999; Kjellberg et al., 2015; Storbacka and Nenonen, 2015), "market work" (Nenonen et al., 2019a) and "market-shaping" (Harrison and Kjellberg, 2016; Kindström et al., 2018).

Market systems, the focal points of market-shaping strategies, are characterized by plasticity (Nenonen et al., 2014) and emergence (Ehret, 2013; Martin and Schouten, 2014; Hietanen and Rokka, 2015). These characteristics allow proactive shaping of markets, and hence almost all market-shaping studies explicitly or implicitly discuss the focal actor's ability to encourage a change in the market system. However, almost no research considers how market-shapers (at the level of the actor) can help ensure that the new or shaped market is a viable one. This gap in understanding is of relevance as new or shaped markets are generally of little use if they cannot endure long enough to enable actors to benefit from them. Understanding how market-shapers can take a system-level approach requires that researchers not only focus on the viability mechanisms that characterize market functioning, but also on the ways in which they work together. Consequently, this paper aims *to examine the mechanisms (i.e., "viability mechanisms") that support market-shaping activities that result in the emergence of a viable market,* defined as one able to adapt to the changing environment over time (Barile and Polese, 2010).

A systems approach is adopted (Padgett and Powell, 2012; Barile et al., 2012; Barile et al., 2016), and accordingly, in this paper: (i) markets are systems; (ii) market-shaping deliberately augments and steers the mechanisms present in these market systems; (iii) when and where some market-shaping activities happen – their spatio-temporal orderings – can facilitate viability mechanisms to let the market maintain its viability, at least temporarily; and (iv) viability mechanisms concern market systems' structural and behavioral properties.

This paper develops a conceptual framework, which identifies viability mechanisms for market-shaping. A longitudinal case illustration of the Finnish timber high-rise building market

between 2008 and 2017 is then used to illustrate how these viability mechanisms result in a newly shaped market. This study makes two theoretical contributions. First, it offers insights into how emergent markets can become viable – and thus how shaped markets can endure. Second, it supplies a "missing link" to market-shaping research by illuminating the workings of the non-linear relationship between actor-level market-shaping actions and system-level market changes. Two managerial contributions also follow from this study. First, would-be market-shapers should look in advance for, or else actively cultivate, these viability mechanisms. Further, and extending beyond market-shaping actions to include potential outcomes, managers should choose the timing of commercialization of innovations so as not to proceed without the establishment of the viability mechanisms necessary to ensure the subsequent stabilization of the emergent market.

Markets as systems

Marketing traditionally considered markets as collections of potential consumers for a product category (Sissors, 1966), emphasizing outcomes like sales, market share and consumption. However, as Mele et al. (2015) conclude, the discourse on market conceptualizations has advanced to a more systemic view, highlighting aspects such as resource integration, value creation and institutions (Nenonen et al., 2019b).

Indeed, the systems perspective on marketing has been recognized as fundamental (e.g., Layton, 2007; Barile et al., 2012; Vargo et al. 2017) and markets have frequently been defined, implicitly and explicitly, as systems in the marketing literature (e.g., Johanson and Vahlne, 2011; Giesler and Fischer, 2016) and management literature (e.g., Kapoor and Lee, 2013; Adner, 2017). However, relatively few scholars have used systems theory to inform their theorizing about systemic markets (for an early exception, see Clearwater 1996).

Thus, in this paper a system is defined as an organized and self-regulating entity, characterized by a recognizable purpose, and able to maintain a dynamic equilibrium with the outside world (Beer, 1972, 1975; Barile and Polese, 2010; Barile et al., 2012). This basic definition is in line with multiple systems theories and approaches (Mele et al., 2010). Among them, the Viable Systems Approach (VSA: Golinelli, 2010) emphasizes system viability in the marketing literature (Barile et al., 2012), extending this definition by adding a further characteristic, that of the viability of the system. Such viability, in the VSA literature, is itself the systems' primary purpose (Barile et al., 2012), and it depends on the system's "ability to adapt to a changing environment by identifying a role to play in each context – that is how to "serve" a need – then satisfying the expectations of other viable systems such as suppliers,

customers, and other stakeholders" (Barile et al., 2016: 656). This echoes recent theorizing in the service-dominant logic where actors are conceptualized to share the common purpose of co-creating value and value is considered as an increase in ecosystem viability (Vargo and Lusch, 2011; Vargo and Akaka, 2012).

Viability mechanisms impacting market-shaping

Beer's (1972) viable system model defines a system as an entity able to adapt and survive in a changing environment. Later work on the VSA developed this concept further (cf., Golinelli, 2010) by focusing on the implications for business contexts and market exchanges of highly dynamic environments and complexity (Barile et al., 2012). According to VSA (Golinelli, 2010; Barile et al., 2012; Barile et al., 2016), the primary purpose of systems is their viability, expressed as survival within their context (Beer, 1985; Golinelli, 2010). VSA acknowledges that viability entails dynamic adjustments of systems in terms of both structure (the configuration of relationships of actors and resources) and behavior (what the system actually does) to survive, while staying stable in relation to the environment (Barile and Polese, 2010) and able to respond to unexpected events, new social behaviors, and highly improbable occurrences (Taleb, 2008).

Systems operate subject to many and various mechanisms. However, for any particular system only a handful of these mechanisms may be necessary to make change viable and self-organization possible. Thus, understanding which mechanisms matter and how is paramount to understanding how markets are shaped.

Establishing viability mechanisms for a conceptual framework

Based on theoretical conceptualizations of systems approaches (including VSA, organizational theory, and system dynamics), in this section four specific mechanisms (both structural and behavioral) that are core to understanding system viability from a market-shaping perspective are proposed. These mechanisms are: (1) *presence of dissipative structures (taken from organizational theory)*; (2) *consonance among system elements* and (3) *resonance among system elements (taken from the VSA)*; and (4) *reinforcing (amplifying) and balancing (stabilizing) feedback* (from systems dynamics). These mechanisms—the first two structural, the latter two behavioral—can help the emergent market system self-organize and adapt to the changing environment, and thus to help achieve viability.

Viability mechanism 1: The presence of dissipative structures. Systems are open, which means that they can exchange energy and resources with their environments (von Bertanlaffy, 1968) through dissipative structures. Dissipative structures are considered

structural characteristics of systems that are able to dissipate useless energy caused by inefficient process while absorbing useful energy to sustain future growth, thus becoming a source of order (Capra, 1996). In this sense, these structures are not only able to maintain themselves in a non-equilibrium state but may also evolve. They characterize the continuous process of renewal found in open systems (e.g., markets) where such systems struggle to be viable and maintain a steady state by balancing order and disorder (Smith and Gemmill, 1991). In a social systems context, Smith and Gemmill (1991) refer to dissipative structures as a structure "able to maintain a greater sensitivity and responsiveness to its environment" that "shift and adjust in order to best process energy, resources, and information amid its turbulence" (p. 700). They further state that dissipative structures can "serve as an idealized design for viability" (ibid., p. 7004). Hence, a shared paradigm or an accepted regulatory framework can be considered as examples of dissipative structures in market systems: these allow contrasting paradigms – in the former case – and actions against the regulatory framework – in the latter case – to be processed and "dissipated" as useless energy that would increase disorder in the system. Moreover, these dissipative structures allow market actors to integrate resources usefully, and they evolve over time – as evidenced by further developments of the aforementioned shared paradigm and regulatory framework.

Increased energy and instability in a system can result in a bifurcation point, where new structures and forms of order may emerge spontaneously (Prigogine and Glansdorff, 1971), thus causing both old and new systems to branch off into divergent paths. Thus, dissipative structures, such as shared paradigms, mental models or regulations, may aid in explaining the emergence of a new market through the introduction of new or novel resources, system properties, and institutionalized order. The novelty of resources, properties and order is critical, as it differentiates the emergence of a new market from the change within the existing market system.

The role of shared institutions and institutionalization leading to more stable markets has been acknowledged in the existing literature (c.f., Nenonen et al., 2014; Wieland et al., 2017). There is also a growing stream of literature conceptualizing market-shaping as institutional work (c.f., Baker et al., 2019). Furthermore, prior research has investigated the role of shared intentions in the emergence of service ecosystems (Taillard et al., 2016) and the capacity of shared mental models to induce change in market systems (Storbacka and Nenonen, 2011a). Finally, other market-shaping studies support the cyclical nature of innovation and market learning processes (Storbacka and Nenonen, 2015).

Viability mechanisms 2 and 3: Consonance and resonance among system elements. Systems also show homeostatic traits (Beer, 1975), which means that they seek to maintain their identity by moderating internal change to achieve internal and external equilibrium. Thus, systems undertake continuous processes of renewal through simple rules and positive feedback to try to maintain a steady state (Capra, 1996). These simple rules and quasi-permanent, yet invisible, substructures are maintained by the consonance and resonance among system elements. Indeed, according to the VSA literature survival depends on the capacity, over time, for consonance and resonance among elements and the environment (Barile and Polese, 2010). Wieland et al. (2012) acknowledge that systems seek viability through relational consonance (i.e., structural compatibility) and resonance (harmonious behavioral interactions for a single purpose).

Consonance in a market system is related to the compatibility of system elements in terms of information varieties, examples of which would include shared values, interpretation schemes of reality, and information. Moreover, consonance can be related to resource compatibility between actors (Polese, 2018). These compatibilities create the structural mechanisms for positive and successful interactions. Resonance, on the other hand, is a behavioral mechanism; it denotes the actual success of interactions which increase the viability of the system (Polese, 2018). For example, two companies can be highly consonant in relation to climate change if they have similar values, perceive the causes and consequences of the climate change in a similar way, and have compatible information about the phenomenon (e.g., its relationship to production processes). This consonance may allow the two companies to cooperate successfully in mitigating climate change (i.e., to demonstrate resonant behaviors). However, consonance does not necessarily lead to resonance – and hence the two example companies may choose incompatible courses of action, leading to possibly detrimental overall results for the environment. Resonance is thus the affinity between the driving force of change and the system itself (Smith and Gemmill, 1991).

Consonance in market systems, described as compatibility or configurational fit between market elements, is explicitly recognized in market-shaping literature (cf., Storbacka and Nenonen, 2011a). In contrast, resonance is largely implicit in themes like the acceptability of a new product category (Rosa et al., 1999), building legitimacy for a new market to gain cooperation of multiple stakeholders (Humphreys, 2010), and "articulating a win-win-win vision for the market" or "helping customers and other stakeholders to operate in the new market" as central market-shaping activities (Nenonen et al., 2019b:628). Albeit using different terminology, the so-called performative turn in studying markets (cf., Kjellberg and Helgesson,

2006; Mason et al, 2017), and in particular what such scholars term the sociological process of translation, also addresses mechanisms related to consonance and resonance.

Viability mechanism 4: Reinforcing and balancing, or stabilizing, feedback. Finally, as highlighted by cybernetic theory, system viability is related to non-linear feedback processes (Wiener, 1950), which are often depicted as cause-effect circles or loops. Such loops have been embraced by systems dynamics (Forrester, 1961, Sterman, 2000) to model and simulate the dynamics of diverse types of systems. From a systems dynamics perspective, system instabilities (growth or decline) can be viewed as products of "reinforcing" feedback, while "balancing" (or "stabilizing") feedback operates whenever goal-oriented behavior supplies self-correction. An example of these processes is used in explaining the emergence of leadership as a new order in a system by Lichtenstein and Plowman (2008). In their study reinforcing feedback (i.e., amplifying actions), reconfiguration of structure, and balancing (stabilizing) feedback are examined. Reinforcing feedback thus helps establish new properties and may produce exponential system growth or decay (Mingers, 2014). By contrast, balancing feedback maintains such new properties and stabilizes their organizational relations. Thus, the system maintains adaptive stability through these two complementary types of feedback.

Reflecting adaptive stability, Biggemann et al. (2013) observe that market-shaping in creating customer solutions is not linear, but a dynamic and iterative process. As possible solutions change, the problem definition changes (i.e., actors reconceptualize the problem). And, as actors' interests and expectations change, they try to reconcile their interests further. Thus, market-shaping activities may permit new elements or properties; but, without suitable balancing feedback mechanisms in place, these elements and properties may not remain stable long enough to have effect: the market may either decay to nothing or grow to the point where another new market bifurcates from it.

The conceptual framework

Drawing on the work of Easton (2010), Bhaskar (2008) and Gross (2009), the conceptual framework links underlying viability mechanisms – identified in the previous section – with entities present in the system. These two elements (i.e. mechanisms and entities) form the basis of this conceptual framework (see Figure 1).

INSERT FIGURE 1 ABOUT HERE

Viability mechanisms act as social causal mechanisms (Gross, 2009; Mason et al., 2013). They operate through their causal powers but are also susceptible to action from other entities

(Easton, 2010). "Entities" (whether human, social or material; complex or simple; structured or unstructured), on the lower side of Figure 1, provide the basic theoretical building blocks for explanation. Entities have agency and can influence the observable reality both directly and via viability mechanisms (Mason et al., 2013). General examples of entities shown in this figure include actors, relationships and beliefs.

In the central part of Figure 1 viability mechanisms, examined in detail in the previous section, act as social causal mechanisms. Such mechanisms are active, enduring, and causally efficacious. They permit researchers to ask themselves by what means have the actions that they are seeking to understand been brought to pass (Gross, 2009; Mason et al., 2013). They operate through their causal powers but are also susceptible to action from entities (Easton, 2010). Finally, there is the observable reality – in the context of market-shaping, the "observable market" – that market actors (and researchers) can witness. The observable market is depicted in its "before" and "after" states in the left-hand and right-hand sides of Figure 1. The right-hand side thus depicts the key outcomes emerging from the viability mechanisms acting on entities and vice versa.

The framework represents a non-linear process that is dynamically evolving through the interplay of the four viability mechanisms linking the market entities with the observable market; it illuminates the workings of the non-linear relationships between actor-level market shaping actions and system level market changes. It also captures the recursive nature of market shaping actions and highlights their dynamic and iterative interrelationship. To demonstrate how the four categories of viability mechanisms shown in Figure 1 and described above occur in the context of market-shaping in practice, the following case illustration examines how these four viability mechanisms enabled a new market to emerge. This case illustration utilizes the conceptual framework in order to provide an explanatory account of how the four viability mechanisms are manifested in practice.

Case illustration: The Finnish market for timber high-rise buildings

Selection of case illustration

Kindström et al. (2018) call for more longitudinal research into the interaction between levels of influence and their order of appearance in market-shaping processes, to illuminate how market-shaping processes unfold. To illustrate how the viability mechanisms identified above enable proactive market-shaping, a longitudinal case illustration of the Finnish market for timber high-rise buildings is used.

Siggelkow (2007) emphasizes how case examples are useful to illustrate conceptual contributions, especially as they offer real-life grounding for what might otherwise be highly abstract constructs. Further, they may go beyond mere illustration and act as powerful instruments in identifying and exploring the underlying mechanisms in causal relationships. Such case examples permit researchers to get closer to constructs rather than abstracting them to quantifiable measures and thus can explore causal relationships more directly (Siggelkow, 2007). The case illustration was carefully and purposively selected following a consideration of a range of other industry contexts. The context considered were as diverse as the screwcap wine bottle closure initiative in New Zealand and peak power provision in India. The empirical material from these contexts was gathered as a part of a long-term research project on market-shaping. After investigation of different alternatives, members of the research team concluded that that Finnish timber high-rise buildings market represented the most apposite of these contexts for the investigation of viability mechanisms.

There were four main reasons behind this choice of case illustration. First, a case was sought that allowed for a sufficiently longitudinal perspective to conclude that the new market system had demonstrated viability over time – while still being able to interview key informants. Second, the case represented a highly complex market system comprising different groups of actors and being subject to multiple social norms and regulations. Third, since materiality is one of the perspectives used to explain how market systems change, the case chosen was characterized both by material core offerings and complex material infrastructures. Finally, cases were excluded that did not provide sufficiently rich sources of secondary materials to complement the primary data[1].

Case background

Traditionally, the vast majority of Finnish detached houses and semi-detached houses have used timber in both frames and facades, the market share of timber – compared to other building

[1] The empirical data informing the case illustration draws on a range of sources. These include four in-depth interviews with key informants (Kumar, et al., 1993) who held crucial executive positions during the active market-shaping period; three of these informants were from commercial companies in the market and one was an executive in an industry association. The interviews were conducted between 2014 and 2015. Presentations given by two different industry associations in 2017 were also used. Additionally, a range of secondary sources that included newspaper and magazine articles, press releases, annual reports, websites of the key organizations, scientific publications, and official government documents were reviewed and analyzed. The secondary sources included 22 annual reports (covering years 2008-2018 for the two relevant publicly listed organizations), 44 issues of specialty magazines, 77 press releases, 8 articles in mainstream popular press, two scientific articles and one PhD dissertation.

materials – being approximately 82% (for frames) and 75% (for facades) in detached houses, and 65% and 45% in semi-detached houses. However, Finnish fire regulations have historically prevented the use of timber frames in buildings with more than two stories. This changed in 1997 when the regulations were eased somewhat, permitting buildings with timber frames up to four stories high. This easing of regulations followed the example of Sweden, where similar regulatory changes took place in 1993-1994 (Bengtson, 2003). Nevertheless, the market share of timber in apartment blocks, public and commercial building as well as industrial buildings in Finland remained negligible.

The first attempt to open the market for timber high-rise buildings in Finland took place in the late 1990s. During this phase approximately 30 apartment buildings of up to four stories high were built out of timber in some 10 separate projects. However, this short burst of activity dwindled relatively quickly. Cross-laminated timber, the main material used in European timber high-rise buildings at the time of the research (the late 2010s), was developed in the early 1990s, and since then it has been used relatively extensively in Germany and Austria. However, it has been primarily used for single-family houses.

Stora Enso, the focal Finnish company of the case illustration, is a leading provider of renewable solutions in packaging, biomaterials, timber constructions, and paper globally with annual total revenue of 10.5 billion euro in 2018. In 1988, Stora Enso acquired another company, Holzindustrie Schweighofer, and through this subsidiary they developed cross-laminated timber production capabilities. Stora Enso started to investigate the market potential of these advanced timber building materials in the early 2000s, and by 2006 the idea had gained sufficient internal management buy-in to initiate action. It should be noted that Stora Enso itself was formed in 1998 through the merger of Swedish Stora and Finnish Enso. Hence, also the Finnish employees of Stora Enso became well-informed about the developments in timber high-rise construction in Sweden.

The initiative by Stora Enso was part of a wider industry restructuring; during the 2000s all large forestry companies were experiencing stable or declining demand for pulp and paper products, and therefore were actively looking for growth opportunities outside their core businesses. The recession of 2008-2009 was particularly severe in Finland, and thus local politicians and government officials became very interested in the development of initiatives that could have positive employment effects. Stora Enso and other Finnish forestry companies capitalized on this window of opportunity and lobbied for a change in fire regulations. Consequently, in 2011 the Finnish fire regulations were subsequently amended and these changes included raising the legal ceiling on use of timber frames to eight stories. In addition

to the changed fire regulations, there were other forms of explicit government support. For example, a program of encouraging investment in timber buildings was initiated by the Finnish Government in 2011 through a national wooden building program. The objectives of this program were, in particular, to increase the market share of timber-framed high-rise buildings to 10% in Finland and to support exports of Finnish timber construction products. Consequently, the market for timber high-rise buildings in Finland started to grow rapidly. By December 2018, at least 65 timber apartment blocks and four timber office blocks had been completed in Finland, with several large-scale projects underway in 2019 (Puuinfo, 2019).

Analysis of viability mechanisms

The conceptual framework of viability mechanisms for market-shaping in Figure 1 is now utilized to examine the specific viability mechanisms operating in the case illustration. The case study highlights the importance of four viability mechanisms that represent mechanisms permitting market-shaping to occur and a viable new market to emerge.

Manifestations of viability mechanism 1: Dissipative structures – (a) Shared mental model allowing market bifurcation and (b) A new fire regulation compatible with local building conventions. When active market-shaping in this context commenced in the late 2000s, awareness of climate change and other ecological threats was already high. Further, timber was recognized as being more eco-friendly than materials such as concrete and steel, particularly in Finland where legislation had long directed forest owners to replace every tree harvested. Examples of the environmental concerns associated with steel and concrete construction included, but were not limited to, excavation to extract sand for concrete, the dwindling repositories of sand suitable for concrete, carbon emissions related to steel and concrete manufacturing, and the largely absent recycling of the steel used in construction. This made for a strong, shared mental model arguing that, essentially, timber is an important eco-friendly building material that should be adopted more widely, which motivated actors in this new market system to self-organize and to embrace this building concept.

In social systems, shared mental models, intentions or institutional logics underlie self-organization and re-organization (Valkokari, 2015; Kijima et al., 2016; Taillard et al., 2016; Monat, 2018). Even tacit agreement behind a shared mental model can maintain social equilibrium (Smith and Gemmill, 1991). Disruptive new information or actors can threaten agreement; in the case example there was a heightened awareness of the environmental challenges related to the dominant building materials of steel and concrete.

Arguably, the lack of a similar shared, sufficiently strong, mental model is a pivotal reason why the previous market-shaping attempt failed in the late 1990s, despite the fire regulations being loosened in 1997 to permit timber frames up to four stories. By the late 2000s, however, the shared mental model related to environmental awareness and concerns offered early structural conditioning and paved the way for timber high-rise buildings.

However, for the market for timber high-rise buildings to be viable, it needed to reflect local building conventions. While Finnish cities and towns are characterized by relatively low-rise buildings, the fire regulations limiting the height of timber buildings to a maximum of four stories were overly restrictive. This is particularly true in the high-growth regions in Finland such as Helsinki, where developers want to maximize their sellable square meters. Hence, aligning the fire regulations with the typical building height allowed by the municipalities for most of the new developments (i.e., six or eight stories) was necessary for the viability of the timber high-rise building market. Hence, the amended national fire regulations, allowing the use of timber frames up to eight story tall buildings, acted as another key dissipative structure for this new market.

Manifestations of viability mechanism 2: Consonance – (a) Changing the offering to match customer practices and (b) Creating an open building product standard. Recall that consonance is structural and concerns intra-system compatibility. A viable system dynamically adjusts its structure and behavior to be consonant within the structure and with its context (Barile and Polese, 2010; Golinelli, 2010). In the present case, two decisions especially fostered consonance, or compatibility between elements in the new market system.

First, Stora Enso soon realized its Finnish customers, namely developers and building companies, did not want cross-laminated timber panels off a production line; instead they wanted advanced building elements and ready-to-install modules. The company was prepared to invest in the required capabilities. This aligned the offerings of Stora Enso and other Finnish forestry firms with the needs of their customers. Re-positioning cross-laminated timber as an integrated service solution enabled consonance between the firm and its customers. This highlights the relational nature of consonance (Barile and Polese, 2010), as it permits new types relationships between buyers and suppliers to emerge based on service rather than goods (Lusch and Vargo, 2014).

Second, the Finnish timber building product companies began experimenting with establishing a common standard. This emerged as the Open Timber Building Standard in 2012. It was open in the sense that customers could now purchase components from different

providers and be confident they would fit together. Further, the common standard attracted companies to this emerging market, whereas lack of credible supply had doomed previous attempts to create a high-rise timber building market. The common standard not only facilitated consonance among suppliers but acted as a pre-mechanism to further dissipative structures such as increased competition and R&D expenditure on developing building opponents. For customers, what emerged was both an alternative to traditional timber as a commodity raw material and a chance to experiment with other products and solutions from different providers in the cross-laminated timber industry. This highlights the structural aspect of consonance in that it stabilized key aspects relating to cross-laminated timber products. Both these manifestations of the viability mechanism of consonance fostered a configurational fit between market elements, in that exploring the use of alternative and more eco-friendly and renewable building approaches gradually became more important to other stakeholders. Over time, this configurational fit was embedded within the structural features of the industry through the development of industry standards (i.e., alternative structures) and the development of complex components rather than raw material-based solutions (i.e., experimentation).

Manifestations of viability mechanism 3: Resonance – (a) Pacifying a hostile industry association for inter-system resonance and (b) Developing a comprehensive education program for intra-system resonance. Recall that resonance concerns harmony creating intra- and inter-system harmonious interactions for a shared purpose. As with consonance, two decisions were instrumental to achieving resonance. First, in 2011, Stora Enso, UPM and Versowood (Finland's three biggest timber building products companies) joined the Confederation of Finnish Construction Industries – the country's main construction industry association. This powerful industry association represents both construction companies and construction products companies – whereas until 2011 it had only represented timber's main competitors: steel and concrete suppliers. Due to the large annual revenue of Stora Enso and UPM (membership fees, and therefore influence, typically depend on annual revenue), the timber building products companies were able to sway the industry association's internal agenda from "pro steel and concrete" to "material-neutral". This change was critical for the stabilization of the new market. The association is very powerful and can strongly influence construction regulators. The fact that the timber building products companies subsequently left the construction industry association in 2016, once the new market system was stable, highlights how resonance allows system change to gain support and become embedded.

The authors believe this decision, which pacified a hostile association, was central in achieving a relative inter-system resonance between timber, steel and concrete market systems. The "old" steel and concrete building product markets had continued after timber bifurcated from them. The peaceful co-existence between these adjacent market systems was largely enabled by the industry association, which continued to work in the interests of its members (including the wood manufacturers) as their material neutral agenda was now considered the 'new normal'.

Second, the Finnish timber building product companies diligently organized and carefully designed "roadshows" for local government officials, architects, engineers, designers and builders since 2010. For example, in 2013 Puuinfo, the Finnish Timber Council, organized roadshows in 13 locations, reaching 2,400 industry participants. These events were instrumental in both educating builders, engineers and architects about timber as a building material, and influencing municipal officials responsible for zoning – as zoning plans often stipulate acceptable materials. The authors posit that the creation of this considerable education program was another pivotal dissipative structure in ensuring that the central actors in the new timber high-rise building market interacted harmoniously and established intra-system resonance.

Manifestations of viability mechanisms 4: Reinforcing and balancing feedback processes – (a) Reinforcing feedback loops related to investments and awards; (b) Stabilizing friction from the open building product standard as genuine balancing feedback loops had yet to emerge. Our analysis revealed two reinforcing feedback loops that contributed to the growth of the new market system. First, the investments Stora Enso and fellow timber building products companies made in production facilities escalated commitment: in order to deliver the business case used to justify the investment, they redoubled sales efforts – and the extra sales justified further renewed investment. The new market system might not have grown so quickly without these investments acting as a reinforcing feedback loop.

The second reinforcing feedback loop concerned architectural awards and competitions. The timber high-rises built right after the 2011 relaxing of regulations (allowing timber frames up to eight stories) deliberately incorporated much design innovation. The awards that flowed early on acted as dissipative structures, spurring other architects' interest in designing high-rise timber buildings. To augment these dynamics further, in 2012 Stora Enso

together with SRV (a self-described leader in innovative construction projects) organized an architecture competition to develop a new residential area, "Timber City", in central Helsinki.

In terms of stabilizing the market system, the Open Timber Building Standard (discussed above under mechanism 2(b), consonance) has contributed towards this. Standardization met the description of balancing, goal-oriented behavior aimed at self-correction, in that it standardized both companies' offerings and customers' expectations. However, the standard lacks the action-reaction dynamics of classic balancing (or stabilizing) feedback loops in biological systems (e.g., the balance between prey and predator populations) and mechanical systems (e.g., the functioning of a thermostat). Hence, the authors posit that the building standard has introduced some stabilizing friction to the market system, but genuine stabilizing feedback loops may not (yet) have emerged in this market.

Discussion

Theoretical contributions

Success in shaping a market may be of little benefit for the market-shaper or other actors if the new or changed market is not viable and hence do not survive long enough to enable actors to benefit from it. Therefore, understanding how viability mechanisms and their temporal and spatial orderings allow market systems to self-organize contributes to better comprehending successful system behaviors.

The conceptual framework developed in this paper begins to redress the absence of even rudimentary research in this area. The spatio-temporal view adopted in this study helps explain why the market for high-rise timber buildings emerged and achieved viability only at a particular time, even though the necessary cross-laminated timber technology had been known for some years. Thus, the same underlying system properties (e.g., technological resources) may yield different outcomes, depending on the spatio-temporal ordering and system-specific interdependencies.

This paper makes two theoretical contributions. First, it offers insights into how emergent markets can become viable – and thus how market shaping can succeed. The study identified the manifestations of viability mechanisms that permitted the Finnish market for high-rise timber building to emerge and endure. Prior market-shaping literature has identified three conditions that enhance or diminish actors' ability to influence markets: ambiguity, complexity and learning (Humphreys and Carpenter, 2018). However, these are related to whether the market system can be changed in the first place, whereas the four viability

mechanisms identified in this study and outlined in the proposed conceptual framework relate to the market's ability to survive over time. Thus, the identified viability mechanisms help explain successful system behaviors.

The second theoretical contribution adds to the market-shaping literature by illuminating the non-linear relationship between actor-level market-shaping actions and system-level market changes. For example, the easing of fire regulations (the second dissipative structure in the Finnish high-rise timber building market-shaping case presented) was not a simple end-result of the focal market-shaping company lobbying the government. Changing attitudes, economic recession and the emerging shared mental model of timber's eco-friendliness and its importance were also needed for this change to take place. The systemic nature of markets, which precludes any simple, linear relationship between market-shaping actions and market-level change, has been touched on in some previous studies (cf., Nenonen et al., 2019b) but has not been properly addressed. Instead, the literature has focused on either analyzing the actions of the market-shaping actor (cf., Kindström et al., 2018) or describing the market-level changes (cf., Kjellberg and Helgesson, 2007). Thus, the results in this present study deliver an important "missing link" to both the scholarly and managerial dialog on market-shaping strategies.

Managerial implications

This paper also makes two managerial contributions. First, the proposed conceptual framework suggests that assessing the four viability mechanisms can provide additional insights for those enterprises adopting market-shaping strategies. Examples of such insights could include waiting until (some of) the viability mechanisms emerge spontaneously or striving to initiate these mechanisms themselves. In particular, market-shapers of all types (e.g., firms, policy-makers, regulators, industry associations, special interest groups and so forth) should strive for shared mental models compatible with the proposed market-level change, as these enable the new market to emerge, self-organize and remain viable.

Second, market-shaping strategies should also look for consonance among system elements or strive for it themselves by, for example, adopting product designs and promoting technical standards that are compatible with supplementary products – and even with competing products. Harmonious interactions (i.e., resonance) among elements within the market system and across market systems are also necessary for successful market-shaping strategies. In addition to compatible product designs and technical standards, various other factors may assist fostering intra-system harmony such as material infrastructures, industry

associations, widely held beliefs, as well as widely accepted practices related to exchanging and using products.

As new markets emerge mainly through bifurcation, whereby the "old" market system continues to exist in parallel to the new, market-shapers should try to avoid – or manage – possible retaliation by actors in the "old" system. However, as Lawlor and Kavanagh (2015) show, market-shapers can circumvent conflicts between the established market system and the emerging one by carefully orchestrating harmonious relationships with the dominant solution.

Finally, market-shaping strategies require positive feedback loops that encourage other actors to partake in and grow the emerging system. But these can drive the new system to another bifurcation point, unless offset by balancing feedback loops. Thus, aspiring market-shapers should also foster the emergence of balancing feedback loops that regulate growth and stabilize the new market.

Implications also exist for the decision to launch innovations. Given their high failure rates (Chiesa and Frattini, 2011; Slater et al., 2014), better understanding viability mechanisms of market systems could also guide managers seeking to commercialize such innovations. In particular, managers could learn how to avoid pushing inventions to market "before their time" – and thus spend commercialization resources more efficiently and effectively. Even if the activities associated with the launching of innovations are not market-shaping per se, innovation managers could take a leaf out of market-shaping playbooks to inform their timing decision and perhaps even complement their commercialization activities by actively fostering the viability mechanisms themselves.

Limitations and future research

The present research is conceptual, using one illustrative case example. Further empirical research is needed for a more detailed understanding of how the four viability mechanisms manifest in the context of market-shaping strategies. Considering the contextual nature of market systems, future research should use empirical settings that are as heterogeneous (i.e., subject to different external controls and impositions) as possible. This would extend our understanding of market systems operating under differing structural, cultural, normative and resource bounded constraints.

The research also points to interesting new research avenues. For example, more information is needed about the continua and configurations of viability mechanisms. Is it necessary for all the four viability mechanisms to be present in order for the market system to be viable? To what extent must each viability mechanisms be present – or are there minimum

thresholds? Furthermore, this present study deliberately adopted the perspective of systems theories. However, the ability of market systems to achieve viability has been studied through different theoretical lenses. Particularly, investigating how market-shaping actors can foster the development of viable market systems using institutional theory (DiMaggio and Powell, 1983) and institutional work (Lawrence and Suddaby, 2006) holds promise. Similarly, developing indicators to measure the viability mechanisms of a market system is expected to be of both theoretical and managerial importance. Moreover, further studies are needed to frame and model the role of feedback loop delays on market system viability. Future research is also called for on the phase transitions of market systems and their relationship with actor-driven market-shaping strategies; for instance, when one market system is likely to bifurcate into several, and when "healthy" viable systems become "unhealthy" stagnating systems.

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Figure 1. Conceptual Framework of Viability Mechanisms Impacting Market-Shaping