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Abstract: This paper addresses the implications of an emerging, increasingly important way of thinking about markets: systems thinking. A market is one of the most foundational abstractions in marketing and business research; yet, it often receives too little attention. As a result, the taken-for-granted assumptions about markets spur from over-simplified conceptualizations of neo-classical economics that depict markets as static and mechanistic. Systems thinking represents a major change in perspective that involves transcending this mechanistic worldview and thinking instead in terms of wholes, relationships, processes, and patterns. We argue that building a theory of markets based on systems thinking, would enable scholars to develop more realistic models that correspond with fast-changing business environment and therefore, increase both the rigor and relevance of future research. To further this aim, we identify the main implications of systems thinking and formulate them into a research agenda to further the systemic understanding of markets.

A Systems Perspective on Markets –

Toward a Research Agenda

Highlights

- We integrate several, previously isolated systems-based research streams within and beyond the marketing literature.
- We summarize systems thinking into four major perspective shifts.
- We explore the key research challenges implied by these perspective shifts for the study of markets.
- We zoom out from a reductionist approach on markets to integrate micro, meso and macro levels of analysis.
- We offer both theoretical and methodological guidance for future research on markets to increase its rigor and relevance.

Dear Anders,

Thank you very much for the opportunity to revise and resubmit our manuscript “A Systems Perspective on Markets - Toward a Research Agenda” for the Journal of Business Research. During the past three months, we have made a major effort to address all the comments we received from our excellent reviewers and believe that the contribution of the manuscript is now much stronger. Our more detailed responses to the reviewers are provided below.

Kind regards,

Stephen, Kaisa, Steve, Bo, Javier and Maria

Response to reviewers

Reviewer #1	Comment	Response
	I truly enjoyed reading the manuscript and think that it addresses a topical and important issue. The writing style is smooth too so JBR readers will certainly enjoy both the 'what' and the 'how' of paper when it is published.	We appreciate your positive comments on our manuscript. We also enjoyed working on this challenging and relevant contribution.
	Esp in from structures to processes and from measuring to mapping it seems as if the underlying assumption is that markets are growing and changing for the better and expanding, and also that this development is rather gradual/incremental. Would it be possible to tone this view down or add the other side of these? For example, recognise the so called dark side of systems/markets and what constitutes them? Also, that that they can be drastically fundamentally changing and collapsing etc? There are many examples of this happening out there at the moment. From a research perspective they are certainly important to note and natural to see when doing research on markets as you are suggesting. Oftentimes they are forgotten but there are some references on similar phenomena that you could refer to. In from measuring to mapping, would you have any additional suggestions/recommendations on methodological issues? Would be interesting to read about them if you could add some. Perhaps	Following suggestions from both reviewers, we reshaped the research agenda section, including the parts related to "from structures to processes" and "from measuring to mapping". We consider these changes have improved the manuscript considerably. In particular, the section on "from structures to processes" has been extensively re-written and contains now discussion also on market disruptions and highlights the importance of understanding all phases of market evolution including how they cease to exit. Methodological issues are considered in more detail in the section on "from measuring to mapping"

	even find some more innovative ones in other disciplines that can be borrowed?	
	Another minor thought is the verb map. To me it seems as if it is not an optimal word that would capture what you are after. Storbacka and Nenonen's script is better as it, to me, signals a more active and interpretive approach than map which could be seen to merely mean drawing by copying what the reality looks like. I interpret that you advocate a more 'interpretive' and thus creative way that can mean different maps of the same reality. Thus, it would be great if another verb was found even if I acknowledge that there can be different maps of the same object having different foci. Map also indicate an outcome as a drawing, illustrating, which need not necessarily be the case if I understand you correctly. If you do not want to use script perhaps represent, reveal etc could be options. Or, then you could just open up the map word a bit more.	Thank you for the suggestion. After a great deal of thought, we decided to retain 'mapping', making it clear that it relates to the identification of patterns rather than a drawing or illustration.

Reviewer #2	**Comment**	**Response**
	For me the article is a combination of an integrative review and a conceptual paper. Overall, I think that, to make this a stronger conceptual paper (c.f. MacInnis 2011, MacInnis 2016), further	Thank you for your specific questions and suggestion which have helped us to improve the articulation of our message in the

	scope remains for a clearer / concise articulation of the foundational questions pertinent to a systems perspective (both in and beyond marketing). Specifically: 1. The authors are proposing a systems perspective as an alternative/preferred perspective for conceptualizing markets. While the authors delineate how systems theory / thinking has been used in previous marketing studies -they do not define this central perspective i.e. what is the your definition of a systemic perspective? (For example on p3 last paragraph you state 'we argue that systems thinking, combined with and (inherently systemic) service ecosystems perspective….' - are you saying here that systems thinking plus service ecosystems is what you define as a systemic perspective and if so this is seems tautological/circular i.e. system defining another system etc. or are you staying that service systems underpinned by systems perspective (and if so what is this systems perspective) etc. How does a systematic perspective relate to other approaches such as service systems/science? In summary, I would like a clear definition and characterization of how you define the central perspective or frame i.e. what is a systems perspective and why should be care about it (e.g. in the introduction). A clearer articulation of the gap / need for a (greater/improved) systematic perspective in marketing than the	manuscript. We would like to respond to each of your eight points, as follows: 1. We have reshaped the theoretical framework of the article, aiming to clarify and improve the flow of those key concepts and definitions on which the manuscript is based. We consider these changes have made our framing stronger and clearer. As is now stated in the Introduction, "We summarize the main implications of systems thinking into four perspective shifts that steer our attention from parts to the whole, from objects to relationships, from structures to processes, and from measuring to mapping." These perspective shifts are addressed in detail later in the paper. We hope that the Introduction chapter now also gives a better account of the need for a systems perspective on markets, and the desirability of drawing together the fragmented, but increasing evidence of systems thinking within marketing literature.

	one we have to date would be welcome - i.e. a clearer articulation of this issue is important would be welcome. For example, you state in the paper that a systemic approach to markets is an emerging phenomenon you outline how systems thinking has been used to describe marketing systems since the beginning of the 20th century. It is not clear what has changed and why a systematic perspective (as you define it) is now more relevant than ever or whether it's just an evolution of systems thinking in marketing?	Furthermore, the section 'The rise of systems thinking in natural and social sciences' now includes a more detailed discussion about the emerging systems-based research streams in marketing and positions our paper as a crucial piece in exploring synergies between these isolated developments.
	2. Further questions that I would like to see addressed include: How does your characterization of a systemic perspective advance extant systems perspectives in marketing (beyond a shift in perspectives Table 1) i.e. what key concerns / gaps will it address? how does the proposed use of a systemic perspective in marketing differ from/translate from other domains? What aspects do not translate and why? What is a market (when you/researchers employ a systems perspective) or is the construct of market replaced by something else? How does the proposed perspective build on, improve, or replace existing systems perspectives in marketing? On a related note, possibly the three paragraphs of section 'The need for a systematic perspectives on marketing' (p. 9-10) could be moved to the end of the introduction or beginning of literature to	2. Thank you for these relevant comments. As stated above, section 'The rise of systems thinking in natural and social sciences' now includes a more detailed discussion about the emerging systems-based research streams in marketing and positions our paper as a complementary and unifying contribution. Your comments have also resulted major changes throughout the research agenda chapter and in deepening our final discussion, in order to make our key contributions clearer and stronger. Following your recommendation, we have moved the text from the former 'The need for

	improve readability/flow.	systematic perspectives on marketing' section to the 'Introduction' and beginning of the 'The systems perspective on markets – building a research agenda' section, and recognize that it has improved readability and flow.
	3. I would also welcome a clearer/tighter articulation of how your proposed perspective may compliment and differentiate other perspectives and constructs (e.g. service ecosystems etc.) which seek to characterize markets, in particular those who have used a systems approach. This is very important for scholars who pursue a research agenda using a systems perspective.	3. We appreciate this observation. As mentioned earlier, changes made in different parts of the text have helped us to clarify those differences among related systems perspectives, including that of the service ecosystems view. We position our contribution as complementary and argue that zooming out to the more general perspective shifts implied by systems thinking, will make it easier to connect the insights offered by these previously isolated research streams, and to elaborate them further for a foundational research agenda for a systems

		perspective on markets.
	4. While the authors highlight the limitations of neoclassical economics in characterizing markets, do other branches of economics also suffer from the same limitations or do other branches of economics adopt a systems approach (e.g. alternative approaches such as complexity economics are mentioned)? If not then the critique includes economics more generally, if yes, what can we learn from other economic (and other disciplinary) approaches who take a systems perspective?	4. Thank you for pointing this issue to us. A section on systems perspective in economics is added to the chapter 'The rise of systems thinking in natural and social sciences' and we draw on, for example, Arthur's (2015) 'complexity economics' in building the research agenda.
	5. While the authors adapt Capra and Luisi (2014) in Table 1 to argue for a shift of perspective implied by systems thinking, following on from the earlier points (1 and 2 above), I would first like a clearer delineation of what systems thinking is (key characteristics etc) and what it is not. I think then the discussion around Table 1 will be more theoretically grounded.	5. As indicated in earlier comments, we consider that changes and additions made in the introduction, literature review and research agenda sections have improved the manuscript, and a clearer delineation and differentiation of systems thinking is presented.
	6. In addition a number of theories e.g. complexity theory, institutional theory, practice theory etc. are mentioned in the discussion (p.10-21) section - entitled systems thinking main shifts in perspective. - Are the authors suggesting a plurality of theories be used in systemic perspective - if so why and are these commensurate (e.g. practice theory and institutional theory?) in terms of developing mid range theory? Alternatively, do the specific theory/theories used foreground some important systemic	6. These points have resulted in a number of changes, especially in the section on "from structures to processes", where, for example, practice theory and institutional theories have been drawn together in the discussion. Our aim, in the changes made, is to provide a more holistic perspective and explore ways to reconcile differences between previously

	aspects of markets (if so which) while obscuring others? If so, to get a holistic perspective, what combination of theories is recommended in your perspective? Finally, what empirical methods do your research questions / agenda suggest?	isolated theory camps through systems thinking. In addition, methodological issues are considered in more detail in the section on "from measuring to mapping". Also, it is stated on page 23, "…the research challenges identified here need to be translated to a more-specific, midrange theoretical level that connects more closely with everyday language and expressions of practitioners."
	7. Within the discussion of the key characteristics of a systems approach, a discussion of previous empirical studies (both within and perhaps beyond marketing) which have employed such approaches (i.e. market systems alone and/or a systemic perspective) would be useful - i.e. are there a lot/little? What have extant empirical studies done well/need to do better and how will the proposed research agenda address these identified gaps? This could be summarized perhaps in a table and the key points highlighted in the main text.	7. We made several literature searches to identify empirical studies about markets using a systems perspective. Only very limited number of articles can be found. Hence, we did not see it necessary to include the suggested table. However, the manuscript has been revised in several other ways. The section 'The rise of systems thinking in natural and social sciences' has now a much more detailed discussion about the systems-based research streams in marketing literature. We have also revised the section "From measuring to mapping" in the research agenda and discuss in more detailed the methodological implications of a systems

		perspective. Also, a completely new section has been added to the end of the research agenda chapter entitled ‘Further thoughts on embracing systems thinking in the study of markets’ that also addresses the topic of empirical studies.
	8. Is it possible to include a visual diagram summarizing your proposed conceptual framework?	8. From your suggestion, we have included visualizations of the main perspective shifts implied by systems thinking in Table 1 on page 10.
	9. There are a number of direct quotations in the paper - I wonder could some be paraphrased to improve readability of the text.	9. Thank you for this request. The revised manuscript has been carefully edited by our native English speaking authors to reduce the number of the direct quotations and to improve readability of the text.

*Title Page (WITH AUTHOR DETAILS)

A Systems Perspective on Markets –

Toward a Research Agenda

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A Systems Perspective on Markets:

Toward a Research Agenda

Abstract

This paper addresses the implications of an emerging, increasingly important way of thinking about markets: systems thinking. A market is one of the most foundational abstractions in marketing and business research; yet, it often receives too little attention. As a result, the taken-for-granted assumptions about markets spur from over-simplified conceptualizations of neo-classical economics that depict markets as static and mechanistic. Systems thinking represents a major change in perspective that involves transcending this mechanistic worldview and thinking instead in terms of wholes, relationships, processes, and patterns. We argue that building a theory of markets based on systems thinking, would enable scholars to develop more realistic models that correspond with fast-changing business environment and therefore, increase both the rigor and relevance of future research. To further this aim, we identify the main implications of systems thinking and formulate them into a research agenda to further the systemic understanding of markets.

Keywords: markets, systems thinking, marketing, complex systems, research agenda

"Hopefully, future marketing scholars and practitioners will devise and use more realistic concepts to analyze the functioning and evolution of markets" (Buzzell, 1999, p. 61).

Introduction

In a recent editorial of *Journal of Marketing*, Kumar (2015) stresses the importance of marketing's staying on top of, and responsive to, the current economic vacillations, emergence of new markets and other fast changes occurring in the business environment. The advances in information technology, in particular, are accelerating these changes. Through digitalization, information travels faster and is more easily shared. According to Normann (2001), such 'dematerialization' and 'liquification' of information provide more opportunities for the creation of new instances of density – the degree to which mobilization of resources for a 'time/space/actor' unit can take place – within society, and makes change faster.

Yet, many mainstream marketing theories are built on assumptions of stability and lack of change, and do not provide realistic means to understand or model the dynamic and turbulent everyday life. In particular, the underlying assumptions behind the conceptualizations of markets are rather static and mechanistic. This stems from the fact that mainstream marketing inherited its market conceptualization from (neoclassical) economics (Arndt, 1981; Mele, Pels and Storbacka, 2014), in which the market is seen as a pre-existing regularity that does not require explanation (Aspers, 2011). As an effect, Venkatesh, Penaloza, and Firat (2006, p. 252) have noted that "paradoxically, the term market is everywhere and nowhere in our literature". Markets are routinely viewed as 'given', and little attention is paid as to how they are formed or changed over time (Buzzell, 1999).

Recently, scholars studying markets within and outside the field of marketing have drawn inspiration from more holistic and systemic conceptualizations to begin to transcend some of the existing controversies (see e.g. Arthur, 2015; Giesler and Fischer, 2017; Padgett and Powell, 2012, Wollin and Perry, 2004). This suggests a need to rethink how marketing

scholars view markets. In other words, important developments and insights challenging the conventional static and mechanistic assumptions of markets are emerging, but these are scattered across the sub-disciplines of marketing, with little proactive linking of them.

We gather evidence of an increasingly important way of thinking – systems thinking (e.g., Capra and Luisi, 2014; Holbrook, 2003; Senge, 1990) – across disciplines, and argue that adopting such view could enable mainstream marketing to overcome the rather static, current worldview and connect much of the fragmented developments in the field. We summarize the main implications of systems thinking into four perspective shifts that steer our attention from parts to the whole, from objects to relationships, from structures to processes, and from measuring to mapping. We then use these perspective shifts to inform a research agenda to further the exploration of systemic understanding of markets. Our contribution is, therefore, well aligned with Shaw and Jones (2005, p. 261) who note that "it appears obvious that any attempt to synthesize schools of marketing thought, or develop a general theory of marketing, must include systems thinking at least as a superstructure". By developing a foundational research agenda to further the systemic understanding of markets, we also directly answer the recent calls for more conceptual scholarship within the field of marketing (see e.g., MacInnis, 2011; Yadav, 2010).

The rest of the paper proceeds in three parts. First, we describe the rise of systems thinking in both natural and social sciences and highlight specifically the increasing evidence of systems thinking within marketing literature. Second, we summarize the main implications of systems thinking and argue that future research on markets should be framed in a way that it captures these four interdependent shifts in thinking. What follows is a discussion of the key research challenges implied by the perspective shifts to further the scholarly understanding of systems-based understanding of markets.

The rise of systems thinking in natural and social sciences

During the 20th century, both natural sciences and social sciences have been embracing more systemic ways of understanding their phenomena. According to Capra and Luisi (2014), this approach challenges the dominant, mechanistic worldview that became deeply ingrained in virtually all fields of science until the late twentieth century. The basic tension between the two worldviews is one between the parts and the whole (Mitchell, 2009; Senge, 1990). The emphasis on the parts has been called mechanistic, reductionist, or atomistic; the emphasis on the whole holistic, organismic, or ecological. In twentieth-century science, the holistic perspective has become known as *systemic* and the way of thinking it implies as *systems thinking*.

Systems thinking has its roots in several diverse sources, such as Smuts' (1927) holism, cybernetics advanced by Ashby (1956) and the general systems theory developed by von Bertalanffy (1969). The change from the mechanistic to the systemic paradigm has proceeded in different forms and at different speeds in various scientific fields. For example, ecologists from early in the 20th century, have stressed the desirability of studying the 'entire life' of natural areas, as opposed to the study of single objects. The Chair of the Ecological Society of America observed in 1933 that, while the trend of research at the time was to study particular objects or organisms in natural science, "…the assemblage to which they belong is ignored or forgotten, together with the fact that they are to be regarded as integral parts of the system of nature" (Shelford, 1933, p. 240). In the 1970's, biologists Maturana and Varela coined the term *autopoiesis* referring to the self-generating, self-maintaining capability of living systems and paved the way for systemic understanding of cognition (Maturana and Varela, 1992; Varela, Maturana and Uribe, 1974).

Systems thinking has been advocated by scholars in several disciplines following its foundation in the natural world. Anthropologists have suggested that ecosystem (or natural

resource) management should move beyond solutions offered through legal, technical and economic methods towards "processes defined in terms of interrelationships and the sustainability of environmental and human systems" (Puntenney, 1995, p. 2). Also, a new direction in human health studies emerged through taking a perspective on the complexity of the living environment (Lebel, 2003). A large multidisciplinary and multinational group of scientists focused on the link between ecosystem research and human well-being (Hassan, Scholes and Ash, 2005). Geographers have adopted an ecosystem concept to land management: "…the ecosystem concept proposes that the earth operates as a series of interrelated systems within which all components are linked, so that a change in any one component may bring about some corresponding change in other components and the operation of the whole system" (Bailey 2009, p. 3-4).

Also in economics, some scholars are rejecting the dominant equilibrium view and moving toward more systemic models (Arthur, 2015; Valentinov and Chatalova, 2014). For example, complexity economics sees the economy in motion, perpetually constructing itself anew and, therefore, emphasizes contingency, indeterminacy, sense-making and openness to change (Arthur, 2015). Even mathematics is shifting toward this direction. For example, Chaitin (2012) speaks about how mathematics is moving away from continuous formulations, differential equations, and static outcomes towards a focus on discrete formulations, combinatorial reasoning and algorithmic thinking.

Given the wide-ranging acknowledgement of the promise of systems thinking as a way to further understanding, it is unsurprising that it is gaining increasing attention from the academic business and management community. Organizational phenomena, it is advised, should "…consist not of dissociated collections of parts but of wholes emerging out of the open-ended interactivity of constituent parts, embedded in broader wholes, especially social institutions, inter-organizational fields and technological paradigms" (Tsoukas & Dooley,

2011, p. 731). Hence, organizational scholars have been urged to look at organizations, not as structures, but as processes of organizing (Weick, 1979).

There is a long, though underdeveloped, tradition of systems thinking in management literature. The term 'system' is widely used, for example, to talk about business system, production system, marketing system, channel system (Barile et al., 2016). A related concept, business ecosystem, was coined in 1993 to offer a systemic and dynamic view on strategy, management issues, innovation and the collaboration among actors (Iansiti and Levien, 2004). Moore (1996, p. 26) defines a business ecosystem as "an economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world." The member organisms included in such economic community are suppliers, lead producers, competitors, and other stakeholders, whose purpose is to produce goods and services of value to customers, who are themselves members of the ecosystem. Over time, the capabilities and roles of the members co-evolve, and tend to align themselves with the directions set by one or more central companies. Ben Letaifa (2014) argues that managers have recognized the relevance of this concept as it grasps the complexity of their business reality in terms of new collaborative and innovative strategies.

In marketing, macromarketing scholars (see e.g. Meade & Nason, 1991, Shapiro, 2006) have been advocating a systems view of markets and marketing, that offers challenges to, and contrasts with, the prevailing neoclassical economic theory based on the idea of resource allocation. These contributions have, however, been rather scattered and not had a major impact on the mainstream marketing literature, which is still characterized by a micro-level and a managerial bias (Giesler and Fischer, 2017; Vargo, 2007). According to Shaw and Jones (2005), the first author to use systems terminology in marketing was Wroe Alderson

(1965)[1]. Alderson and Cox (1948) drew attention to the dynamic features of markets, the importance of cooperative as well as competitive behavior, and to "…all of the types of organized behavior systems that are significantly involved in the marketing process" (p. 148). Alderson's work was carried forward by his students and colleagues, who delineated micro- and macro-marketing systems (Fisk, 1967), and showed how the marketing system was integrated into the larger society of which it forms a part (Dixon, 1967). However, discussions of marketing systems, *per se*, declined during the 1970s with the rise of marketing management and consumer behavior (Shaw & Jones, 2005). One of the notable exceptions was Arndt (1981, p. 37) who raised the importance of institutions in marketing systems, defined as "…sets of conditions and rules for transactions and other interactions".

More recently, the gauntlet of marketing systems has been taken up once more by macromarketing academics. For Layton (2014, p. 2), a marketing system is "complex social networks of individuals and groups linked through shared participation in the creation and delivery of economic value through exchange". The formation and growth of such marketing systems are deemed to be underpinned by social mechanisms, interacting at the micro, meso and macro levels (Layton, 2014) – features similar to a service-ecosystems approach, as will be discussed. Recently, the marketing systems approach has been applied to social marketing in order to broaden and deepen social marketing theory, and make it better equipped to deal with the complex challenges confronted by social marketers. As Domegan et al. (2016, p. 1135) observe, "We believe social marketing progresses when it facilitates joint actions across and between micro, meso and macro levels".

In addition to the discussion of marketing systems, there has been a surge of other systems-related research streams introduced to the marketing literature. These include complexity theory (e.g., Holbrook, 2003; Wollin and Perry, 2004), viable systems approach

[1] Alderson termed his approach to marketing thought as 'functionalism', but it is better described as 'systems' (Shaw and Jones, 2005).

(Barile et al., 2012) and market system dynamics (e.g., Giesler, 2008; Giesler and Fischer, 2017). Although developed independently, all of these contributions share the common goal of providing a more comprehensive, systems-thinking-grounded framework to increase the understanding of emergence and transformation of markets by viewing them as complex systems. Market system dynamics, a discussion originating from consumer research and consumer culture theory (CCT), is particularly positioned to challenge three prevailing biases—the economic actor bias, the micro-level bias and the variance bias—which they see plaguing marketing scholarship currently (Giesler and Fischer, 2017).

Parallel to these developments, many members of the service research community have started to embrace a systems view, as part of the continuing development of service-dominant (S-D) logic (Vargo and Akaka, 2012; Vargo and Lusch, 2011; 2016; Edvardsson, Tronvoll and Gruber, 2011) and service science (Chesbrough and Spohrer, 2006; Spohrer and Maglio, 2010). S-D logic highlights systems thinking to be important for dealing with the, often massive, direct and indirect service exchange that occurs in economy and society (see e.g. Vargo and Lusch, 2011). Consequently, the S-D logic literature (Lusch and Vargo, 2014; Vargo and Lusch, 2011, 2016) has identified the concept of a *service ecosystem* to capture this systemic dynamism. Vargo and Lusch (2016, pp. 10-11) define a service ecosystem as "a relatively self-contained, self-adjusting system of resource-integrating actors connected by shared institutional arrangements and mutual value creation through service exchange".

The opportunities, opened up by a service ecosystems perspective on studying markets, build upon the alternative framework for understanding exchange and value creation that transcends different characterizations of markets based on the 'type' of outputs exchanged (Lusch and Vargo, 2014). This perspective enables a movement towards a more unified basis for theorizing on markets (Vargo, 2007). Additionally, as the service ecosystems perspective highlights the role of institutions—rules, norms, meanings, symbols, practices,

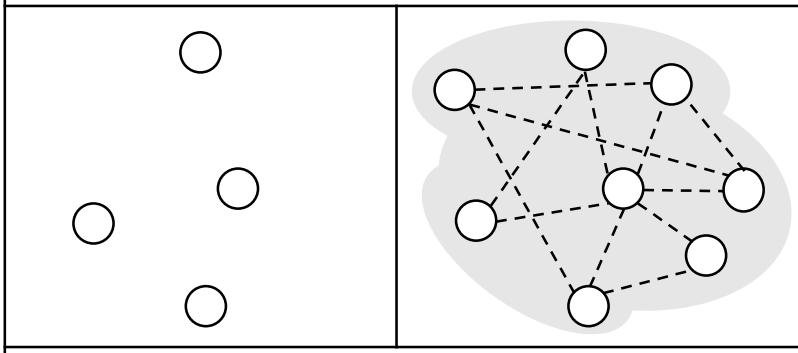
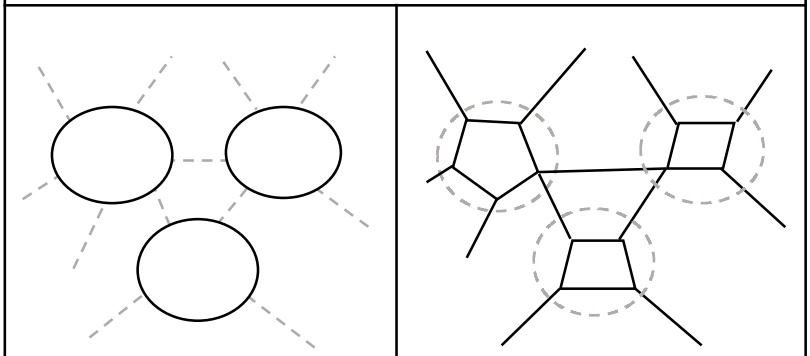
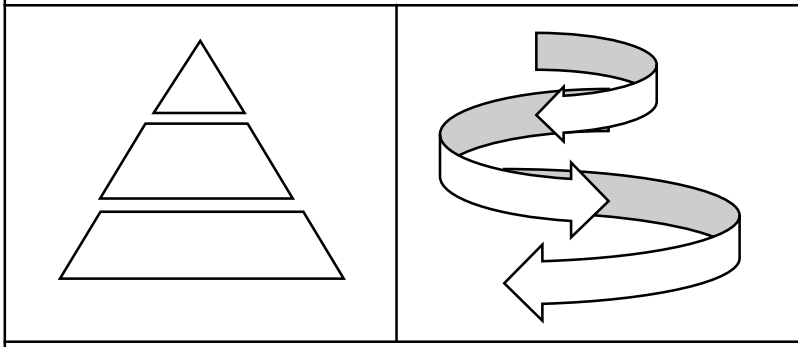
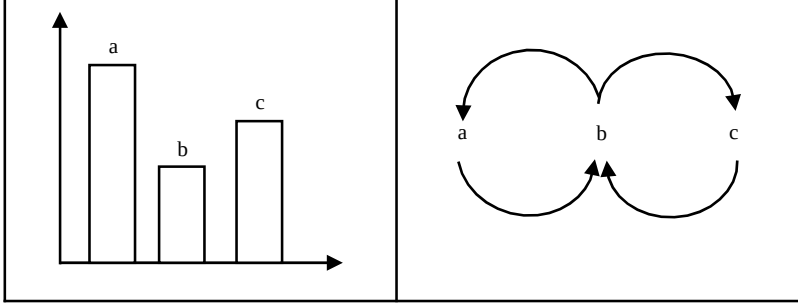
and similar aides to collaboration—and, more generally, institutional arrangements—interdependent assemblages of institutions—as endogenous coordination mechanisms of markets (Vargo and Lusch, 2016), it is also well aligned with the broader movement towards "institutions–history–social structure nexus" as a way to study markets (Araujo and Pels, 2015).

As shown, a wide-range of natural and social sciences are embracing systems thinking and becoming more processual and open as a consequence. The current marketing literature also includes several emerging research streams that highlight the importance of acknowledging more complexity in marketing phenomena and point toward a systems perspective on markets. To date, these research streams have largely been developed independently, with little attempt to explore the obvious synergies between them. We argue that zooming out to the general, systems thinking, implies shifts in perspective that will make it easier to connect the insights offered by these research streams, and to elaborate them further for a foundational research agenda for a systems perspective on markets.

Systems thinking – main shifts in perspective

We summarize the main implications of systems thinking into four major shifts in perspective that we see as the most critical for marketing and especially the study of markets. These are shown in Table 1 and elaborated in subsequent sections.

Table 1. Four major perspective shifts implied by systems thinking.

Perspective shift		Description
From the parts to the whole		Complex systems are wholes whose emerging properties cannot be reduced to those of smaller parts.
From objects to relationships	 Adapted from Capra and Luisi (2014, p. 81)	Objects are seen as networks of relationships, embedded in larger networks.
From structures to processes		All structures are seen as manifestations of underlying processes.
From measuring to mapping		Methodologies need to move toward mapping and identifying patterns, because relationships and processes cannot be measured in the traditional sense due to their emerging properties.

A unifying feature in the systems literature across disciplines is to rethink phenomena as complex systems. A complex system is a system made up of a large number of parts that

interact in a non-simple way (Mitchell, 2009). In such systems, "the whole is more than the sum of the parts, at least in the important pragmatic sense that, given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole" (Simon, 1962, p. 195). Hence, the first and most general characteristic of systems thinking is the shift of perspective *from the parts to the whole*, which implies that the systemic properties of the whole cannot be reduced to those of the smaller parts (Simon, 1962, Senge, 1990). In fact, the emerging systemic properties are destroyed if a system is physically or conceptually dissected into isolated elements.

The move from the parts to the whole in systems thinking posits that all natural phenomena are ultimately interconnected, and that their essential properties, in fact, derive from their relationships to other things (Kast and Rosenzweig, 1972). The shift from the parts to the whole also entails a shift *from objects to relationships*. The primary unit of analysis is relationships and interactions; secondary are the boundaries of the discernible relationship patterns – the so called countable "objects" (Capra and Luisi, 2014). The implied interconnectedness of phenomena makes systems thinking inherently multidisciplinary (Barile et al., 2012; Lusch et al., 2016).

In systems thinking, structures are seen as manifestations of underlying processes (Capra and Luisi, 2014). Hence, systems thinking includes a shift of perspective *from structures to processes*. This means that a complex system is more than a shape or a static configuration of components, making it essential to understand the self-generating and self-organizing processes of such a system (Varela, Maturana and Uribe, 1974).

In the traditional scientific enterprise, things are measured and weighted. However, the emphasis of relationships and processes in systems thinking means that the main units of analysis cannot be measured in the conventional sense (Capra and Luisi, 2014). Hence, the perceptual changes of systems thinking go hand in hand with a methodological change *from*

measuring to mapping. Mapping is done to identify repeating configurations – patterns – among relationships (Gleick, 1987). Networks, feedback cycles and boundaries are all examples of such patterns of organizing that are at the center of attention in systems thinking.

The systems perspective on markets – toward a research agenda

Neoclassical economics frames the market as transactions between rational buyers and sellers who aim to maximize utility and profit (Stigler and Sharwin, 1985). This perspective of the market is criticized regarding its neglect of the real workings of the market (Lie, 1997), its over-emphasis of the role of the 'product' and the price mechanism (Mele et al., 2014; Vargo, 2007), its inability to handle time (Alderson and Cox, 1948), and its failure to account for the influence of the broader social structure (Bagozzi, 1974; Granovetter, 2005). Nevertheless, the conventional conceptualization of markets, as groups of potential consumers of a given product and brand (Sissors, 1966), which prevails in marketing thought, is still built on these assumptions.

As a response to these limitations, several alternative ways of conceptualizing markets within the marketing literature have emerged. They include looking at markets as communication networks (Samli and Bahn, 1992), knowledge structures (Rosa, Porac, Runser-Spanjol, and Saxon, 1999), sign systems (Venkatesh, Penaloza, and Firat, 2006), practices (Kjellberg and Helgesson, 2007), complex systems (Giesler, 2008; Wollin and Perry, 2004) and institutional solutions (Vargo and Lusch, 2016). We argue that the perspective shifts associated with systems thinking can overcome the limitations of the neoclassical approach and provide a way to synthesize insights from the alternative perspectives on markets. In Table 2, we identify the main implications of the systems perspective for the way markets are conceptualized, and the key future research challenges that are implied.

Table 2. Key research implications and challenges of a systems perspective on markets.

Perspective shift	Research implications for the study of markets	Key challenges for future research
From the parts to the whole	- Market as a complex system (whole) has emerging properties that cannot be observed and understood by studying its parts in isolation - Overcoming the separation of micro- and macro phenomena in markets and the importance of zooming out and in from the whole to the parts and vice versa	- How markets as complex systems (wholes) behave? - What are the emergent properties of markets? - How micro phenomena bring forth macro phenomena in markets and vice versa?
From objects to relationships	- Interconnectedness of the market phenomena and the implied multidisciplinarity - Focus on the mechanisms that coordinate the formation of relationships and the resulting configurations	- How relationships bring forth markets? - How the constellations of relationships are coordinated within markets?
From structures to processes	- Markets as dynamic, becoming, evolving - The structures of markets are manifestations of underlying processes - From snapshot data to longitudinal data	- What are the underlying processes manifesting markets? - How markets emerge, evolve and cease to exist? - How innovation is related to market evolution?
From measuring to mapping	- Identifying patterns in markets - From quantities to qualities - Dynamic modelling, and feedback loops - Understanding the feedback structures of markets	- What are the enduring patterns of markets? - What kind of feedback mechanisms characterize markets?

From the parts to the whole

As noted, whereas the research on markets has previously focused on and (over)emphasized a specific part of a market (e.g. either consumers, firms, products, services or brands), systems thinking emphasizes the importance of understanding markets as wholes.

In complexity economics, markets are not seen as something given and existing, but forming from a constantly developing set of technological innovations, institutions, and arrangements that draw forth further innovations, institutions and arrangements (Arthur, 2015). In other words, markets can be understood as complex systems. Hence, one of the key research questions for the future concerns *how markets as complex systems (wholes) behave?* An important contribution in answering this question is provided by macromarketing, which has, for over thirty years, focused on understanding the market, marketing systems and the role of marketing in the society (Mittelstaedt, Kilbourne, and Mittelstaedt, 2006), but has remained as the primary intellectual pursuit of a relatively limited number of academics (Shapiro, 2006).

Webster and Lusch (2013) suggest that scholars give priority to studying forward-facing firms who have already adopted a broader market view and developed management practices to support these more holistic understanding of markets. Further research is needed to understand emerging marketing and management practices. This is also discussed by Storbacka and Nenonen (2011), who suggested the need to develop a general theory of the market, by defining markets as configurations. They focus on how market configurations emerge and evolve in a business-to-business context and call for future research on how market configurations emerge in different settings and what capabilities actors need and use when shaping market configurations. Furthermore, future research should be focused also on the dynamics of value co-creation as an emergent property of markets as systems and ecosystems (Barile et al., 2016). Thus, the perspective shift from the parts to the whole points to identifying *what are the emergent properties of markets.*

In addition, there is a need to understand the way actors and resources interact within systems to bring forth emergent properties in markets as an aggregation. Hence, related questions include: what are the drivers behind these emerging properties? And what motivates actors to behave the way they do and also to change their behaviors, for example, toward

more sustainable way of organizing markets? In this regard, Barile et al. (2014) discuss the contribution of the viable systems approach (VSA), in analyzing sustainable business behaviors. By using a conceptual model of 'the viable systems cycle', the authors propose a different approach to the analysis and interpretation of sustainability that concerns the relationship among efficiency, effectiveness and sustainability itself and the way they orient and influence sustainable business behaviors that have a clear link to markets (Barile et al., 2014).

As stated, complex systems have holistic, emergent patterns that can only be seen and understood by zooming out from individual actors or resources to higher levels of aggregation. Correspondingly, Giesler and Fischer (2017) argue for the need to challenge the micro-level bias commonly present in traditional marketing, by theorizing multi-level relationships as one of the essential aspects of market system dynamics. However, lower-level perspectives are also necessary to understand the origins of this emergence. Thus markets, conceptualized as complex systems, are best understood by zooming out and zooming in on different levels of analysis (e.g., macro, meso, and micro) (Chandler and Vargo, 2011; Vargo and Lusch, 2017). Hence, having a systems perspective on markets poses the question: *How micro phenomena bring forth macro phenomena in markets and vice versa?*

At the heart of overcoming the separation of micro- and macro-levels is the existence of fractals – patterns that are repeated at different systemic levels of analysis (Mandelbrot, 1983). Fractals occur in dynamic systems as recursive patterns emanating from simple processes in systems with feedback. In society and business, they can be seen in the repeating structural patterns such as firms, markets, and societal structures (i.e. institutional arrangements), that are both recursively formed from actor relationships and provide their context (cf., Giddens, 1984). One of the advantages of fractals is that they imply that very complex phenomena can be understood in terms of relatively simple rules. Hence, a

potentially, highly-productive way forward is to explore how thinking in terms of fractals will change our understanding of markets.

An important related research topic is to study how environmental, social and ethical issues affect the emergence and configuration of markets (Bakan, 2016). For example, how does the sharing economy (Szetela and Mentel, 2016) foster the development of markets driven by environmental, social and ethical issues? In addition, the idea of social innovation as a key to understanding the creation and transformation markets towards sustainable development (Boons and Ludeke-Freund 2013) offers a fruitful research direction. This includes studies of solution-based business models to better understand inclusive service innovation within specific social contexts in emerging markets (Reynoso et al., 2015). How have social innovations shaped markets and their evolution in the long term (e.g. over the last 100 years) and more recently (e.g., the latest 20 years)? Interesting empirical contexts for looking into these issues include healthcare, education and tourism.

From objects to relationships

As mentioned, the shift of perspective from the parts to the whole can also be seen as a shift from objects to relationships. In other words, "what we call a part is merely a pattern in an inseparable web of relationships" (Capra and Luisi, 2014, p. 80). The shift from objects to relationships, entails breaking free from the methodological individualism characterizing the neoclassical model of the market as aggregates of rational buyers and sellers. Within the marketing literature, IMP scholars (e.g., Håkansson and Snehota, 1995; Ford et al., 2011) have highlighted the need to go beyond the buyer-seller dyad and take into account the broader set of actors: sellers' suppliers, buyers' buyers, etc. A key difference is that this view does not take a sequential perspective, such as a value chain, but considers all actors simultaneously (Mele et al., 2014). As a result, there has also been an ever-increasing

realization that firms do not create value in isolation (Håkansson and Snehota, 1989); rather, firms engage in cooperative value creation processes that involve multiple actors and resources (Prahalad and Ramaswamy, 2004). Future research should explore how collaborative relationships with multiple stakeholders with different intentions create markets: that is, *how relationships bring forth markets?*

The term 'co-creation of value', emphasized within S-D logic (Lusch and Vargo, 2014), is inherently associated with vanishing boundaries between actors within markets, and moving from objects embedded with value to joint activities of multiple actors through which value emerges. According to Barile et al. (2012), this alternative value co-creation model shifts attention from production to utilization, from product to process, and from transaction to relationship, and thus enhances sensitivity to the complexity of roles and actor systems. The resulting service ecosystems perspective (e.g., Lusch, Vargo and Gustafsson, 2016; Vargo and Lusch, 2016) offers potential insights into the issue of how human actors coordinate their intentions and actions to be able to have cooperative trade through markets.

However, more research is needed to better understand *How the constellations of relationships are coordinated within markets?* One of the fruitful research directions to this end is institutional theory. An increasing number of studies have recently identified institutions as the key constructs for understanding markets and their dynamics (see e.g., Dolbec and Fischer, 2015; Ertimur and Coskuner-Balli, 2015; Vargo and Lusch, 2016). This implies that attention must be paid to the institutionalized norms, rules, meanings, symbols and practices shared by actors participating in markets. Other related questions include: What roles do standards and standardization organizations play in creating market dynamics? How do intellectual property rights (IPR) enable or inhibit market dynamics?

Furthermore, moving attention from objects to relationships acknowledges the interconnectedness and complexity of the studied phenomena. This makes systems thinking

inherently multidisciplinary as it can be used to discover similarities between different phenomena and to integrate academic disciplines. In line with Shaw and Jones (2005), we also emphasize the usefulness of systems thinking to overcome the fragmentariness of marketing by providing the basis for a more holistic understanding of the phenomenon of a market. Instead of dividing the field of marketing into ever smaller sub-disciplines and research streams, systems thinking enables scholars to research the connections between different perspectives on markets and synthesize their insights. Hence, future research on markets should aim at drawing on and connecting the rich discussions about markets from different sub-disciplines of marketing and across disciplinary boundaries.

From structures to processes

As stated, systems thinking is essentially process thinking (Capra and Luisi, 2014) and focuses on the dynamic rather than static nature of phenomena (Varela, Maturana and Uribe, 1974). Hence, a systems perspective avoids the emphasis on structural elements of markets such as size, region, products, and so on (Barile et al., 2012). Instead, it implies a need to conduct research to cross boundaries among traditional disciplines by bringing in new theory, frameworks and methods, to increase our understanding of market systems as processes. For research on markets this means that, rather than understanding a market as a static state of equilibrium of demand and supply, systems thinking sees a market as an ongoing, emerging process, reflecting the markets creative response to changing conditions. These processes cannot be understood if there is not a switch from a short-term to a long-term perspective and if market phenomena are not studied longitudinally.

The move from structures to processes points toward examining *what are the underlying processes manifesting markets?* Findings from practice theory and institutional theory provide directions for tackling this question. Practice theorists have, over the last

decade, sought a deeper conceptualization of markets (Araujo, 2007; Andersson, Aspenberg and Kjellberg, 2008). This research stream had its origins in bridging the gap between 'individualism' and 'societism' to respect both the efforts of individual actors and the workings of the social (Whittington 2006). In their efforts to reconcile the same dualism, institutional theorists have maintained that *institutionalization* represents the "process by which actions become repeated over time and are assigned similar meanings by self and others" and "the social process by which individuals come to accept a shared definition of social reality" (Scott, 1987, p. 495-496).

Practices are built upon shared understandings, cultural rules and procedures that enable sets of human activities (Whittington, 2006; Araujo, 2007; Araujo, Kjellberg and Spencer, 2008). In the markets-as-practices framework by Kjellberg and Helgesson (2006, 2007), markets are constituted by three interlinked types of practices performed by market actors: *normalizing practices*, serving to establish normative objectives; *representational practices*, serving to depict markets and/or how they work; and *exchange practices*, serving to realize individual economic exchanges (Kjellberg and Helgesson, 2007). This view also emphasizes *performativity*, that is, the possibility that ideas, theories, and models of markets and other forms of economic governance not only describe such events, but contribute to the enactment of these events by providing normative guidelines for action (see e.g., Callon, 1998; MacKenzie and Millo, 2003). When applied to markets, the notion of performativity asserts that markets are the continual outcomes of practices (Kjellberg and Helgesson, 2006). The practice approach to markets is especially important in shifting the view of the market being a pre-exiting regularity into looking at markets as on-going constructions. This view implies the importance of asking *how markets emerge, evolve and cease to exist?*

In other words, systems thinking indicates that future research should take a long-term perspective in understanding how new markets emerge and existing markets change, and in

some instances, are replaced with better solutions to new or existing problems. As it emphasizes the process of institutionalization (Vargo, Wieland and Akaka, 2015), the service ecosystems perspective is aligned with the conceptualizations of markets that shift the focus away from markets-as-structures towards markets-as-processes (Kjellberg and Helgesson, 2007; Mele et al., 2014). Such a process perspective on markets sheds further light on their formation and evolution; the importance of which has been stressed in the past in the literature on markets (see e.g., Alderson and Cox, 1948; Buzzell, 1999), but not really thoroughly examined.

To synthesize institutional and practice approaches, markets in S-D logic are conceptualized as 'institutionalized solutions' (Lusch and Vargo, 2014, p. 25). This means that markets consisting of relatively enduring and shared, that is, institutionalized, value cocreation practices (Vargo and Lusch, 2016), and that well-established markets can be thought of as socially constructed solutions, nested or embedded within a particular service ecosystem (Lusch and Vargo, 2014). One of the starting points for future research in market evolution is the concept of *institutional complexity* which is seen as a prerequisite for the emergence of novelty in service ecosystems (Siltaloppi, Koskela-Huotari and Vargo, 2016).

Studying path dependencies in markets in transition is another way for future research to develop conceptualizations that capture the complexities in market emergence and evolution and thus contribute to a deeper understanding of markets in action. This includes understanding how interconnected behaviors emerge by focusing on the propagation of change and the disruptive transformations that can occur as a consequence (see e.g., Arthur, 2015). This leads to a question of *how innovation is related to market evolution?*

Although, the literatures on innovation and markets are traditionally considered separate and disconnected, a systems perspective on markets provides an opportunity to examine the synergies between the two (Vargo et al., 2015). With this in mind, future

research should focus on how specific events, such as innovations, occurring in one market can cause "a cascade of events: often this cascade or avalanche propagates to affect only one or two further elements, occasionally it affects more, and more rarely it affects many" (Arthur, 2015, p. 11). One of the recent technological advances worthy of special attention is the Internet-of-Things (IoT) – a technical process of converting previously static and unmovable information into a dynamic, transportable resource. It is anticipated to create disruption in the way markets are currently organized (for a recent review see Ng and Wakenshaw, 2017). Another fruitful context for studying cascading changes, to better understand the evolution of markets, is the stock market which has inbuilt systemic properties, whose behavior can produce domino effects on a global scale.

A systems perspective on markets is well-aligned with a view of markets as dynamic entities that are open to shaping by those actors who collectively generate them and their form (see e.g. Nenonen et al., 2014; Rosa et al., 1999). Hence, it implies that scholars should focus on how actors make sense of creating and shaping markets under different conditions. What can we learn from entrepreneurs behind AirBnB, Apple, IKEA, KidZania, Skype, SpaceX or Uber? Another rich, complex living laboratory, in which actor's efforts in market shaping can be studied, synthesized and extended, can be found in the increasing activity at the "base of the pyramid" (Ben Letaifa and Reynoso, 2015). As Layton (2011) argues, the marketing systems in the developed countries "stand in sharp contrast with the primitive systems in which many people live every day" (p. 273-274). By focusing on the processes creating and recreating markets, future research can aim to identify, analyze and explain how and why markets emerge, evolve and cease to exist.

From measuring to mapping

The shift from a mechanistic approach to a systemic one raises a number of epistemological and methodological concerns. Perhaps the most overarching issue is concerned with rethinking the meaning of theory. Most traditional conceptualizations concern interrelated set of concepts and models that support explanation and prediction (see e.g., Hunt, 2010). The underlying assumption is a reductionist one. That is, the implication is that investigating individual conceptual relationships and stitching them together can establish a theory, defined in terms of predictive validity. However, as discussed before, one of the key characteristics of systems is emergence (Georgiou, 2003; Kozlowski et al., 2013) - the generation of higher-order structures through lower-order activities. As such, it is non-reductionist – the whole cannot be understood as the sum of its parts. Thus, by definition, emergence does not readily lend itself to prediction. This appears to imply, at least in some instances, the sufficiency of construct validity (e.g., explanation), as compared to the more traditional requirement of predictive validity.

This argument implies an expansion of traditional methodological approaches (Held et al., 2014). Kozlowski et al. (2013) provide an overview of research approaches that point toward the increasing use of more direct qualitative (e.g., ethnography, action research, etc.) methods, as well as less-traditional, computational and simulation-based methods, that lend themselves to the direct investigation of the process and dynamism of emergence.

Perhaps of particular note is agent-based modeling, which observes the complex, meso/macro-level structures that emerge from micro-level, virtual actors interacting under a set of simple rules of behavior. The method has been used sparingly in business and marketing, though there are exceptions (e.g., Tay and Lusch 2005). Its potential, and guidelines for its use, appear to be surfacing (e.g., Held et al 2014; Rand and Rust 2011). However, it is important to note that the rule-based models studied in agent-based modeling

represent ‘restricted complexity’ (Byrne and Gallaghan, 2014), as they are focused on the question of how macro-level structures emerge from micro-level, but not how the micro-level structures emerge simultaneously from the macro-level.

The acknowledgement of general complexity urges us to see the deeper patterns lying behind the events and the details also in markets and social systems. Weick (1979) argues that, to make sense of complexity, it is better to capture it by using verbs rather than nouns, Therefore, he urges to see organization as a self-generating pattern – a system of immanently generated and constantly recreated order. His notion of organizing makes this concept suitable for the analysis of socio-economic phenomena at different levels: from small groups, right up to large-scale processes of socio-economic change. In line with his view, we suggest that future research on markets should focus on qualities rather than quantities and to ask: *What are the enduring patterns of markets?* Following Weick (1979), it is possible to conceive a market as a self-generating pattern and constantly recreated order. Methods to identify and map these patterns should represent a focus, in future research, by zooming in on different system levels from small groups of actors to large scale processes of socio-economic and market changes. Mapping, rather than measuring, can identify predictable patterns and generalizable complexities.

All systems are governed by circular cause-and-effect relationships known as feedback loops. Sometimes, these behaviors snowball exponentially in what is called a reinforcing feedback loop. The result is that systems have abundant reinforcing and balancing feedback loops that, together, create the behaviors that we see day-to-day. A systems perspective on markets thus requires an understanding of w*hat kind of feedback mechanisms characterize markets?* As noted, moving from measuring to mapping requires new methods and methodological approaches. As Barile et al. (2016) contend, there is a need to develop “new tools and methods for making better decisions and aligning stakeholders in an

increasingly interconnected world with numerous, complex, urgent problems" (p. 666). There is scope, for example, to leverage the access to massive open data about markets, their actors' interactions, and outcomes including data over time. How can the use of Big Data, sensors, GPS and other technologies help in understanding such feedback mechanisms in different kinds of markets?

Further thoughts on embracing systems thinking in the study of markets

A few notes of explanation are probably appropriate for moving this initial research agenda forward. First, while the suggested key research challenges and directions are associated with specific shifts in thinking, it should be kept in mind that these shifts are very much interdependent and should be considered and applied holistically as one moves from mechanistic to systems thinking. Second, we are aware that the research agenda is sometimes relatively abstract. We believe that, for the purposes of this article, this level of abstraction is appropriate.

However, in the future, the research challenges identified here need to be translated to a more-specific, midrange theoretical level that connects more closely with everyday language and expressions of practitioners. Likewise, future research on markets will need to be conducted at various levels of aggregation (e.g., micro, meso, and macro), keeping in mind that these analytical levels should be understood as different perspectives on the same systemic phenomena (see e.g., Vargo and Lusch, 2017). Finally, the key research challenges need to be translated to contextualized research questions that can be subjected to empirical investigation, keeping in mind, as suggested, that the emergent nature of systems requires adjustment in both methods and validation criteria. In short, this research agenda is intended to provide foundational directions with maximum degrees of freedom in execution.

Conclusions

The world we live in is complex and fast changing and this dynamic characteristic is becoming more apparent. Thus, it is important for marketing and management scholars to revisit and re-evaluate some of the abstractions that are used to interpret and understand basic phenomena. We argue that the concept of a market is especially in a need of reconceptualization. There is an increasing amount of scholarly work pointing to a more elaborated understanding of a market, than the neoclassical economic model of the market as aggregation of rational buyers and sellers, or the dominant marketing interpretation of the market as a group of consumers desiring a specific product. What needs to be taken account of is "the incredible complexity of human nature which was disregarded by traditional theory for very good reasons, but which must be spoon-fed back into the traditional findings for the sake of greater realism" (Hirschman, 1984, p. 95).

In this article, we highlight four fundamental perspective changes representing an emerging alternative way to understand phenomena – systems thinking – and discuss the implications of these perspective shifts for the future research of markets. Systems thinking entails changing the way markets are thought of by steering out attention from parts to wholes, from objects to relationships, from structures to processes and from measuring to mapping. Based on these perspective shifts, we identify several key research challenges which embrace the complexity of markets, through bringing together insights from several, previously rather disconnected research streams and discussions within and beyond marketing. The outlined research agenda is a first step toward overcoming some of the fragmentariness of marketing as an academic field, and answering the call by Buzzell (1999) who urges scholars and practitioners to use more realistic concepts to analyze the functioning and evolution of markets.

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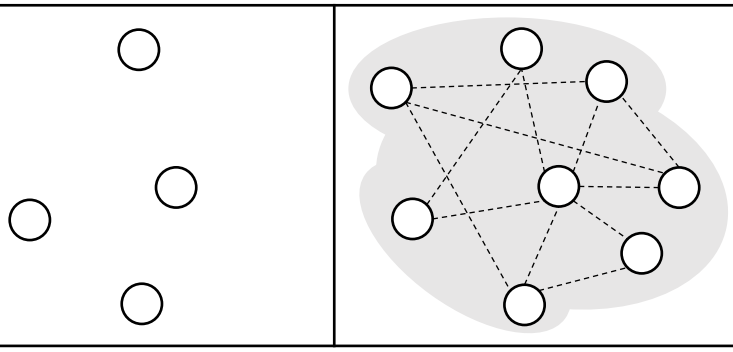
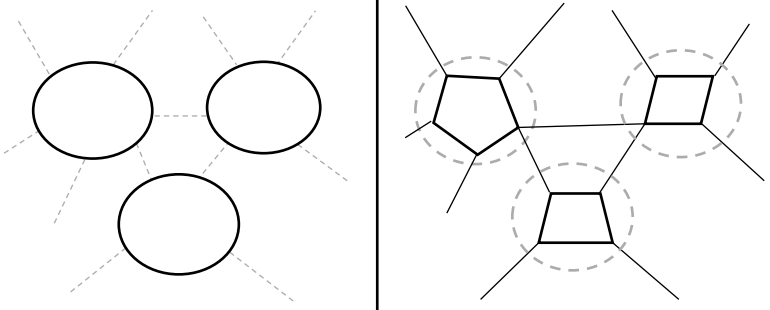
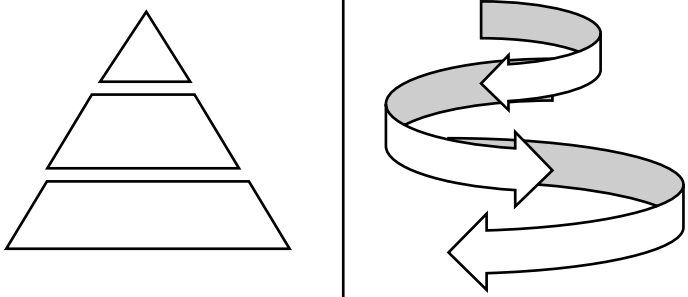
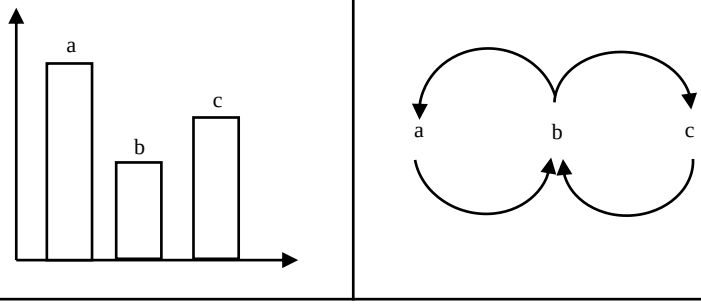
Table 1. Four major perspective shifts implied by systems thinking.

Perspective shift	Description
From the parts to the whole 	Complex systems are wholes whose emerging properties cannot be reduced to those of smaller parts.
From objects to relationships  Adapted from Capra and Luisi (2014, p. 81)	Objects are seen as networks of relationships, embedded in larger networks.
From structures to processes 	All structures are seen as manifestations of underlying processes.
From measuring to mapping 	Methodologies need to move toward mapping and identifying patterns, because relationships and processes cannot be measured in the traditional sense due to their emerging properties.