
Organizational capabilities as the key to Sustainable Innovation

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Abstract: Whereas organizations traditionally approach sustainability from a technical perspective, and strive to “do things better”, we argue that the sustainability challenges of our time require companies to “do things differently”. This differentiation and market creation strategy will allow companies to sufficiently leverage sustainability as a business opportunity. We introduce the concept of Sustainable Innovation (SI) as the means for companies to create new markets through the synergetic relationship of sustainability and innovation. Although academic literature has broadly noted the significance of SI, we fill the gap in literature by describing *how* to achieve SI. We argue that in order to achieve SI, different organizational capabilities are needed. After providing a theoretical basis as well as a theoretical framework, we consequently offer an organizational capabilities model that facilitates SI, supported with fourteen hypotheses. The hypotheses are formed through academic literature and case study research.

Keywords: Sustainability; Sustainable Innovation; Organizational Capabilities

The growing concerns for sustainability within the business landscape compel organizations to leverage sustainability as a business opportunity. We define sustainability as “...meeting the needs of the present without compromising the ability of future generations to meet their own needs”¹. We argue that traditional organizations are not fully equipped for this challenge. We propose that this is not because these organizations lack motivation, but rather because sustainability is approached through a primarily technical perspective. This perspective inherently leads to technically-oriented solutions geared at energy efficiencies, waste reductions and resource efficiencies (to name a few). In order to make the sustainable transition and leverage sustainability as a

¹ Brundtland, G., and Khalid, M. 1987. *Our Common Future. World Commission on Environment and Development*. Oxford University Press.

competitive edge, the challenge lies not so much in “doing things better” as the technical perspective facilitates, but rather “doing things differently”.

In order to make the shift to “doing things differently”, companies have to become capable of what we call Sustainable Innovation (SI): *“the synergetic relationship between sustainability and innovation in the core of organizations that drives the development of radically new business (products, services, processes, systems and behavior) and in doing so creating long-term social, environmental as well as economic value”*.

Academic literature has long encouraged sustainability as a topic for the corporate agenda by focusing on the (un)profitability of incorporating sustainability practices (e.g. Lee , Faff & Langfield-Smith, 2009; Hill, Ainscough & Shank, 2007; Margolis, Elfenbein & Walsh, 2007; Pava & Krausz, 1996). More recently, sustainability has been identified as the new driver for innovation (Nidumolu, Prahalad & Rangaswami, 2009; Jorna, 2006; MacGregor, Espinach & Fontrodona, 2007), arguing that only companies that make sustainability a goal will achieve the desired competitive advantage. Little literature, however, has discussed *how* organizations can innovate sustainably. Yet it is just this *how* question that is vital when equipping an organization to meet the sustainability challenge, and leverage it as a business opportunity.

We argue that SI within organizations can be facilitated through fostering certain organizational capabilities. In this paper we will identify the capabilities that are conducive for SI, based on existing literature and case studies. We will look at these capabilities from a systems perspective in order to justify the complex interactions between these capabilities. This research aims to contribute not only to academic literature, but also to business by creating practical insights for managers to facilitate SI within their organizations. The resulting model serves as a basis in answering *how* organizations can become capable of SI.

This paper starts by providing a theoretical background and describing the methodology of our research. Subsequently we will briefly discuss a number of cases and thereafter present the theoretical framework and the corresponding organizational capabilities, alongside initial support. We will finish by offering directions for future research.

1 Theoretical basis

Prior to discussing the relevant theories concerning the development of the capabilities model for SI we will discuss the changing position of sustainability in an academic and business context.

In the past 20 years, a shift has been observed in the global sustainability agenda from legislation to sustainability as a competitive advantage. This is illustrated by the significance of an international agreement such as the Kyoto Protocol in 1997 versus the voluntary carbon neutral commitments that several businesses (HSBC and BT to name a few) made a mere decade later. The aforementioned example also demonstrates how public pressure can influence corporate response. The Kyoto protocol was conceived at a time when governments were held accountable for sustainability issues, whereas organizations are expected to take their responsibility today.

Elkington distinguishes three phases in the evolution of the sustainability agenda, each influenced by so-called waves of public pressure: compliance, competition and market creation. These phases and the consequent corporate responses are summarized in table 1.

Table 1 Three phases of the Sustainability Agenda

<i>Phase 1: Compliance</i>	<i>Phase 2: Competition</i>	<i>Phase 3: Market Creation</i>
Cause: Increasing understanding of environmental impacts and scarcity of natural resources	Cause: Increasing awareness of the environmental impacts of production processes and possible cost savings	Cause: Increasing recognition of the fact that sustainability will demand profound changes in the power of corporations.
Effect: Increasing environmental legislation imposed on organizations by governments	Effect: Organizations take on an initiating role with respect to sustainable production	Effect: Organizations seek to capitalize on sustainability through creating new market opportunities.
Result: No penalties	Result: Cost-savings	Result: New revenues

Source: Adapted from J. Elkington (2004).

Whereas Elkington's phases outline the external business context, this paper argues that the internal organizational responses to these external pressures are defining in whether or not an organization is able to cope with the shift in the sustainability agenda.

Table 2 presents a maturity model in which the different stages of sustainability awareness and action are described.

Table 2 Maturity model for sustainability in business

	<i>Stage 1: Inactive</i>	<i>Stage 2: Reactive</i>	<i>Stage 3: Active</i>	<i>Stage 4: Proactive</i>	<i>Stage 5: SI</i>
External positioning of Sustainability	Prevent condemnation	Advertising	Pollution prevention	Product stewardship	Sustainable transition
External driving force	Minimize negative publicity	Consumer awareness	Minimize emissions, effluents and wastes	Minimize life-cycle cost of products	Differentiation
Competitive advantage	-	New consumers	Cost reduction	Pre-empt competitors	Future position
Internal positioning of Sustainability	Legal department	Communications department	Sustainability department	R&D	Strategy, innovation
Organizational capabilities needed	Legal	Marketing and communications	Technical (internal) and operational excellence	Technical (external) and strategic	Innovation
Phase of Sustainability Agenda	<div> <div>Compliance</div> <div>Competition</div> <div>Market Creation</div> </div>				

(Table 1)

Sources: Adapted from S. Hart (1995) and J. Elkington (2004).

We argue that external pressures often lead to a changing awareness and action on behalf of companies towards the sustainability issue. As illustrated in table 2, the corporate focus of sustainability generally moves from a primarily legal perspective (i.e. preventing condemnation for irresponsible activities) towards a strategic perspective (i.e. viewing the sustainability challenge as an opportunity and stronger competitive advantage). During this shift, the primary positioning of sustainability within the company changes, requiring different organizational capabilities.

SI can be interpreted as the set of capabilities which organizations need to progress from stage four to stage five sustainability as presented in table 2. To this day, the dominant approach to innovating sustainably within firms is to minimize harmful effects by “doing things better” (stages 3 and 4). As such, the sustainability challenge within these firms is a largely technical and exhaustive exercise in which mainly incremental savings are realized within designated areas such as energy efficiency, resource efficiency and waste management. The shift to SI (stage 5) is especially significant as in this stage firms capitalize on sustainability as a differentiation strategy and in doing so seek new revenues. The ensuing innovation or “doing things differently” requires a different type and perhaps even source of innovation. We contest that this innovation in which businesses transform cannot be achieved *solely* through the technical approach, but is also very dependent on organizational capabilities that facilitate innovation.

SI will require firms to rethink their organizational capabilities. This paper will attempt to fill the gap in academic literature by providing an organizational capabilities model that addresses *how* organizations can facilitate SI.

2 Theoretical Framework

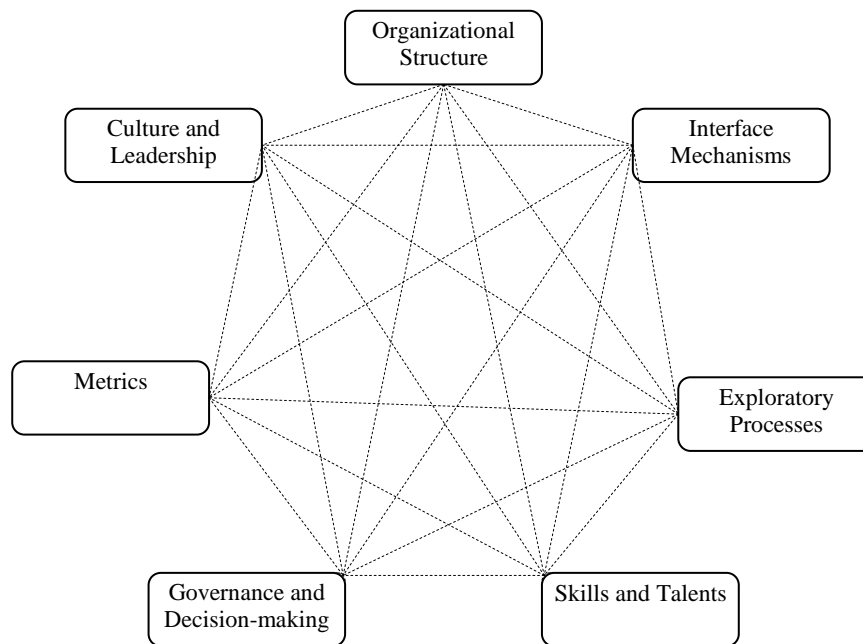
In order to configure an organizational capabilities model conducive for SI, we will first select a theoretically and contextually appropriate model that can serve as a starting point.

Academic and management literature have broadly announced the importance of systems thinking within the domain of sustainability, and more specifically the sustainable transition – “doing things differently” (Senge et al., 2008; Hjorth & Bagheri, 2006; Heinbokel & Potash, 2000). Within the context of this research we find systems theory particularly appropriate for two reasons: it sufficiently addresses the interplay between organizational context and organizational action, and it considers organizations as systems of independent yet interacting elements (Jorna, van Engelen & Hadders, 2004).

As such, we have taken the systemic innovation capability model developed by O'Connor (2008) as a foundation for this research. O'Connor draws upon systems theory and recent developments in dynamic capabilities theory for the creation of a framework addressing innovation capabilities in organizations; in which interaction with the organizational environment is incorporated. The dynamic capabilities view of innovation is relevant as it assesses the extent in which an organization is able to facilitate innovation and opportunities for business renewal in changing environments (Teece, 2007; Teece, Pisano & Shuen, 1997).

The innovation capability model (see figure 1) consists of seven separate organizational elements that are linked through synergetic relationships and as a whole form a system. The seven elements represented in the model are: organizational structure, interface mechanisms, exploratory processes, skills and talents, governance and decision-making, culture and leadership, and metrics.

Figure 1 O'Connor's Innovation Capability model



Source: O'Connor (2008).

3 Methodology

In order to arrive at an organizational capabilities model that is conducive for SI, academic literature was reviewed for every element represented in the model. In doing so, a theoretical basis is provided for the data gathering phase. Consequently, the data was gathered using a case study approach, as this method is especially suitable for initial testing of specific propositions (Jans & Dittrich, 2008; Yin, 1994). In this research we strive for "...detailed, in-depth data collection involving multiple sources of information rich in context..."² in order to create hypotheses about the organizational capabilities needed to become capable of SI.

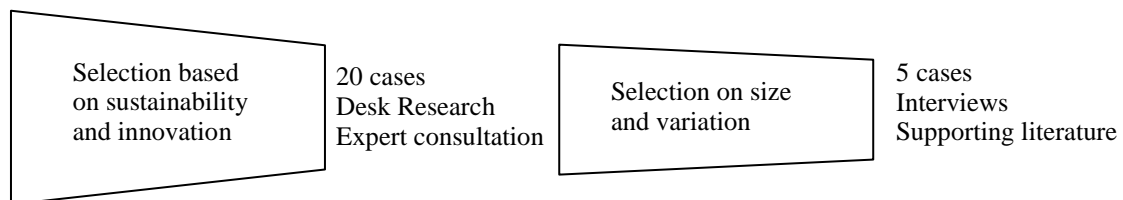
Case selection

² Creswell, J.W., 1998. *Qualitative inquiry and research design: choosing among five traditions*. London: Thousand Oaks.

The selection of relevant cases was performed in two steps. First, a selection of twenty companies was made on the basis of both their iconic sustainability performance, as well as their innovativeness. The former was assessed using the expert panel ratings of corporate sustainability leaders ranked by The Sustainability Survey provided by Sustainability and Globescan³.

The selected companies were consequently studied on the basis of extensive desk research and expert consultation. Of these twenty case studies five (Hedges, 1985) were selected for more detailed research. The hypotheses were formed based upon further research of five companies. The selection was made on the basis of sustainability and innovation performance while taking into account company size and industry variation, leading to the following sample: Ealcon B.V., InterfaceFLOR Inc., Rabobank Group, TNT N.V. and Unilever N.V.. These cases were studied in more detail through conducting interviews with employees representing different departments.

Figure 2 Case selection



Data gathering

The first selection of twenty cases was used to gain increasing focus with respect to the discussion topics for the data gathering phase, as well as the relevant organizational capabilities to further research. The interviews, lasting between 1 and 1,5 hours, were structured while other parts focused on the uncovering of information from a free-flow discussion.

The interviews started with confronting the interviewees with seven cards each representing one of the seven innovation capability components of the O'Connor model. Visuals were used as this allowed for equal interpretation of the innovation capability concepts among the interviewees (Sekaran, 1992). Targeting the gathering of data on the configuration of the innovation capability, the interviews then proceeded by discussing the different elements, and how these are embodied within their respective organizations and represented in the organizational capabilities needed.

4 Cases

Prior to introducing the model for SI, we will discuss two practical cases in order to give insight into how the hypotheses were derived. The two companies we chose to discuss here, InterfaceFLOR and Rabobank operate in different industries, yet both succeeded in sustainable transition. For each case, two elements will be presented in order to illustrate the overall "fit" with the model as presented in this paper.

InterfaceFLOR

³ Sustainability (www.sustainability.com); Globescan (www.globescan.com)

InterfaceFLOR is a company active in carpet production, an oil intensive business. InterfaceFLOR's founder and former CEO, Ray Anderson, boldly announced in 1994 that his company would have to be regenerative by 2020. Since Anderson's so-called "environmental epiphany"⁴, InterfaceFLOR has booked tremendous progress with respect to the environmental goals: 80% waste reduction, 80% less water usage in the production process, 43% energy reduction...

These achievements are noteworthy, but more impressive is the company's capacity to really "do things differently": 36% of the primary resources used are either recycled or bio-based, 30% of the companies' energy is derived from renewables, as well as bringing numerous innovative products to market. As the following delineation of two organizational capabilities elements illustrate, InterfaceFLOR is exemplary of having chosen an extraordinary approach in achieving her ambitious sustainability goals:

1. Culture and Leadership: InterfaceFLOR would not have become an iconic company in terms of sustainability without the visionary leadership of Ray Anderson. Anderson inspired change in his company and thereby planted a seed for other employees to get involved in sustainability through both improvements as well as innovations.
2. Metrics: The ambitious sustainability goal as set by Anderson is carefully translated to tangible metrics and annual targets within every level of the organization. Employees have targets with respect to their team's sustainability contributions, and are awarded accordingly.

Rabobank Group

Rabobank Group (Rabobank) is an international financial service centre structured on a cooperative basis. The cooperative structure is based on the bank's former roots in local agricultural societies. As the description of the following two organizational capabilities elements illustrates, Rabobank's approach in achieving sustainability is significantly different than those taken on by other banks:

1. Organizational Structure: As previously mentioned, Rabobank is a strongly decentralized company, each subsidiary carrying its' own responsibility for securing revenues, client satisfaction, as well as innovative products and/or initiatives. The decentralized concentration of authority has spread the duties for achieving the bank's overarching sustainability goals, and has led to significant sustainable innovations.
2. Interface Mechanisms: Rather than focusing merely on own product innovations, Rabobank has created breakthroughs in several industries through value chain initiatives, using its' strong position as a financial institution. As such, Rabobank has succeeded in engaging in collaborative relationships with her partners, and in doing so has transcended its' own sector in terms of sustainable innovation.

Not only has Rabobank been extremely successful in creating breakthroughs in several industries; it is noteworthy to mention that during the financial crisis, approximately 13 billion euros of savings were transferred to Rabobank accounts by private clients. Employees and clients account these significant switches to the fact that Rabobank has

⁴ Anderson, R., with White, R. 2009. *Confessions of a Radical Industrialist*. New York: St. Martin's Press.

always been a reliable bank – focusing on long-term interests rather than short-term gains; being exemplary for SI.

5 Hypotheses

In the previous paragraphs we discussed the relevance of a firm capabilities model that facilitates SI. We will now progress by validating the different hypotheses derived from the case studies. By doing so, we elaborate on what the presumed shift from “doing things better” to “doing things differently” entails for organizational capabilities. A brief discussion of each element in the O’Connor framework will be given below (in no particular order), in which we present our hypotheses and link them to academic literature. Together, these hypotheses form the model which offers insight in *how* to facilitate SI within companies.

Culture and Leadership

Prior academic studies have stressed the importance of an organizations culture and leadership in creating corporate commitment towards sustainability (Kleef and Roome, 2005; Dunphy, Griffiths and Benn, 2003; Petrick et al., 1999). Within this element we can distinguish between corporate culture, referring to the norms, values, behavior patterns, rituals and traditions of an organization; and leadership in referring to the derived management style following from this culture.

Innovation theory has previously explicated the need for a learning and entrepreneurial culture, allowing for idea generation and internal cooperation in order to foster innovation (Volberda, 2004; Gratton, 2007). Such open and learning cultures generally offer room for experimentation, in which mistakes are not relentlessly frowned upon, but rather viewed as a learning opportunity. Furthermore, management aiming to achieve SI must resonate accordingly and support the search for new ideas rather than exploiting existing routines (Volberda & van den Bosch, 2004). This leads to the first hypothesis: *“Organizations that have corporate culture open to change are more likely to be/become capable of SI”*.

Corporate culture can inherently be derived from an organizations leadership. More specifically, the upper echelon theory argues that the individual attributes of corporate leaders strongly influence the preferences and attitudes of the organization, as well as the resulting team dynamics (Hambrick and Mason, 1984). In line with the upper echelon theory, an organization’s leadership can influence the extent to which organizations engage in sustainability (Lepoutre, 2008). This is confirmed by a large-scale survey in which CEO visionary leadership and integrity were indeed predictive of the organizations social responsibility values (Waldman et. al., 2006). This leads to the second hypothesis: *“Organizations that have visionary leadership that is supportive of sustainability are more likely to be/become capable of SI”*.

Exploratory Processes

Another element in enabling SI in is the support of processes and structures. The element “Exploratory Processes” comprises the processes and structures that are conducive for SI.

In 'The Necessary Revolution', Peter Senge argues that the sustainability challenges of our era are so complex that they cannot be solved on one's own⁵. The bringing together of sometimes fairly unusual parties can lead to radical innovations. This coincides with the principle of Open Innovation as defined by Chesbrough (2003), in which he argues that "...not all of the smart people work for us, so we must find and tap into the knowledge and expertise of bright individuals outside our company"⁶. We therefore propose that research and innovation should not necessarily originate from internal (and often confined) R&D departments, rather we pose that interaction with external parties can lead to bright ideas and new directions for SI. As such, we formulate the first hypothesis as follows: *"Organizations that have structures and methods to engage in open innovation processes are more likely to be/become capable of SI"*.

A second important factor in facilitating SI through exploratory processes is the actual time allocated within organizations to create new links in new directions. Academic research has long stressed the importance of committing the necessary time, money and leadership to research and development (Delbecq & Mills, 1985; Mumford, 2000). Modern-day examples such as Google are known for their allocation of time for innovation purposes in their "Innovation-Time-Off" program which has already lead to sustainable innovations as Google Earth Engine and Google PowerMeter. This leads to the second hypothesis: *"Organizations that allocate time for employees to spend in non-core activities according to their own insight are more likely to be/become capable of SI"*.

Interface Mechanisms

Interface mechanisms refer to the infrastructures between the organization and the outside world, as well as within the organization, that facilitate participation in the innovation process by a multitude of parties (O'Connor, 2008).

Innovation literature has broadly described the importance of internal interface mechanisms in order to facilitate innovation (Moenaert et al., 2000; Adler, 1995). Specifically, literature has referred to items such as cross-functional cooperation, and internal knowledge management systems to be supportive in pursuing more radical innovations (Hansen, 1999; Tapscott, Ticoll & Lowy, 2000), and sustainable innovations in particular (McElroy, 2002). These internal interface mechanisms build upon the assumption that bringing together employees from different departments, who inherently hold diverging perspectives, within one innovation challenge can lead to more radical innovations. This leads us to the following hypothesis: *"Organizations that have methods and structures for internal cooperation and knowledge sharing are more likely to be/become capable of SI"*.

With regards to external interface mechanisms, we find that organizations pursuing SI maintain inherently different relationships with their customers, suppliers, and other established partners. More specifically, we find that these relationships transcend traditional buyer-supplier relationships in which more often than not zero-sum games are attained. Rather, the established relationships in SI are based on the idea of collaboration,

⁵ Senge P., Smith B., Kruschwitz, N., Laur J., and Schley, S. 2008. *The Necessary Revolution* New York: Doubleday.

⁶ Chesbrough, H. 2003. The era of open innovation. *MIT Sloan Management Review*. 45:35-41.

and accordingly aimed at achieving win-win situations. This is supported by Senge, Carstadt and Porter (2001) who argue that cooperative behavior will tend to occur when organizations see that they have a common fate or goal, which is typically the case with respect to sustainability. As such, we formulate the following hypothesis: *“Organizations that have methods and structures to engage in collaborative relationships with external parties are more likely to be/become capable of SI”*.

Metrics

Although an array of organizations has sprouted over the past two decades taking the measurement of sustainability as their primary focus⁷ and an increasing number of firms has adopted these guidelines and reporting measures, we find that these sustainability metrics are seldom the focal point of (innovation) strategies. Instead, we find that sustainability targets are often subsidiary to the overarching goal of financial success.

Many organizations feel the necessity to take sustainability seriously, but translate this urge to unrealistic targets. What we find in these organizations, is that the targets are often translated into short- or medium-term targets, that do not relate to sustainability in the long run (Hargreaves & Fink, 2006). Conversely, organizations that have been more successful with achieving sustainability success, such as InterfaceFLOR, have set a clear long-term strategy (ambitious yet achievable) with regards to sustainability. Consequently, long-term goals that are translated to annual targets offer employees direction regarding sustainability and SI. Academic literature also supports this notion, in which the importance of a long-term planned strategy is mentioned as vital for achieving SI (MacGregor, Espinach & Fontrodona, 2007). This leads to the first metrics hypothesis: *“Organizations that have long term goals and targets embedded in their everyday practice are more likely to be/become capable of SI”*.

It is important that the aforementioned goals and targets enhance not merely sustainability performance but SI. In line with the prior hypotheses these targets should induce a culture of collaboration, and thus innovation, rather than a culture of competition (Nahapiet, Gratton & Rocha, 2005). We therefore pose that the targets should not be allocated at the individual level, but rather at team (or even inter-organizational) level in order to stimulate cross-functional collaboration. As such we can formulate the following hypothesis: *“Organizations that primarily use group-based, non-financial metrics are more likely to be/become capable of SI”*.

Skills and Talents

Skills and Talents explore what is needed on an individual level in order to strive for SI. Within this element we distinguish between recruitment of new employees and training of the existing workforce, where both factors resonate the elements of collaboration and representation of multiple perspectives.

First of all, it is important for organizations to attract and recruit individual employees that can help achieve the goal of SI. As previously mentioned, the sustainability challenges of our era are so complex that they cannot be solved on one's own (Senge et al., 2008). On the one hand this calls for a collaborative mindset (Gratton, 2007), and on the other hand a representation of diverse mindsets. The latter stresses the importance of

⁷ E.g. Global Reporting Initiative, Dow Jones Sustainability Index, True Sustainability Index

the build-up of the workforce. Academic literature supports the notion that the diversity of the workforce in terms of academic training strongly facilitates sustainability performance (Epstein & Roy, 2001). This leads to the following hypothesis: *“Organizations that have a diverse workforce (in terms of academic background and/or training) are more capable of SI”*.

Secondly, it is important for organizations striving for SI to continue to nurture and broaden the mindset of their existing employees. On an individual level the understanding for other functional areas, and perhaps even the creativity for radical innovations, can be stimulated through diversity in training options within the organization. Whereas many multinationals have created large-scale management traineeship programs, these programs often insufficiently accommodate the individual learning needs (or wants) of the employee in order to create new insights. Rather these programs are focused on developing “traditional style” managers who are often trained in process optimization. It is important to note that we do not dismiss optimization as a strategy altogether, yet argue that the nurturing of diverse talents within organizations helps facilitate SI. As such, we can formulate the following hypothesis: *“Organizations that allow for non-function related training of employees in terms of skills and/or capabilities are more capable of SI”*.

Governance and Decision-making

In order to move towards SI, it is important that both the governance structure as well as the decision-making mechanisms and criteria facilitate this penultimate goal. We distinguish between two different factors: the inclusiveness of the governance and decision-making structure on the one hand, and the inclusion of diverse criteria for decision-making on the other hand.

We pose that the governance structure and the way that decisions are made will need to change in order to encompass a more collaborative thought. Academics have stressed the importance of involving cross-functional and different perspectives in the decision-making process in order to feed both sustainability progress (Wondolleck & Yaffee, 2000) and innovation processes (Zajac, Golden & Shortell, 1991). This is in stark contrast with the fairly hierarchical manner in which decisions are generally made in traditional firms. As such, we formulate the following hypothesis: *“Organizations that involve multiple entities (e.g. departments and corporate levels) in decision making processes are more capable of SI”*.

Aside from who is involved the decision-making structure, it is also important that sustainability criteria are included in the decision-making process. In traditional organizations, innovation projects are often reviewed in terms of costs, expected NPV and lead times. In effectuating the long-term strategy of SI, innovation projects should sufficiently correspond to the overarching, longer term, goal of sustainability. Academic literature supports the inclusion of sustainability metrics in contributing to the success of sustainability programs (Schwarz, Beloff & Beaver, 2002). More specifically, Total Cost of Ownership and Life Cycle Cost mechanisms are well equipped to assist managers in decision-making including sustainability metrics. We therefore formulate the following hypothesis: *“Organizations that involve sustainability metrics in their decision making processes are more capable of SI”*.

Organizational Structure

Within the element organizational structure we distinguish between the concentration of authority and the manner in which the authority is composed.

Regarding the concentration of authority, we find that firms that successfully embody SI often have decentralized organizational structures. This decentralization of authority as a means to achieve SI is confirmed by academic literature (Epstein, 2008). Conversely, centralization is criticized for narrowing the communication channels, resulting in a reduction of the quality and quantity of ideas and knowledge retrieved for problem solving (Nord & Tucker, 1987; Sheremata, 2000). SI requires the integration of non-routine problem solving and deviation from existing knowledge in order to “do things differently”, and as such we argue that decentralized structures are likely to be more effective in achieving this (Wondolleck & Yaffee, 2000). This leads us to the following hypothesis: *“Organizations that have a decentralized concentration of authority are more capable of SI”*.

As can be distilled from the abovementioned hypotheses, traditional hierarchical organizational structures can be questioned in their effectiveness to achieve SI. Academic literature supports this notion in arguing that high levels of control among superiors within organizations can reduce the likelihood that employees seek innovative and new solutions (Atuahene-Gima, 2003). A logical analysis can confirm this thought, seeing that strong power-based hierarchies are efficient mainly in assigning tasks, whereas SI requires broad idea-generation at all levels of the organization. We do not, however, dismiss the hierarchy in organizations altogether, as hierarchical structures can generally offer clarity and structure to further the innovations generated within the organization. Instead, we pose that the hierarchy should be skill-based, enticing commitment, rather than power-based, in which the hierarchy is an instrument of control (Walton, 1985). As such, we formulate the following hypothesis: *“Organizations that have a skill-based hierarchy are more capable of SI”*.

6 Summary

We argue that organizations that aspire to capitalize on their sustainability strategies should take an inward look at their capabilities. Organizations have historically aimed to optimize processes and consequently approach sustainability from an efficiency perspective. The sustainability challenges of our day ask for an additional approach in which “doing things differently”, and thus innovation are central. When validated, the SI model as summarized in table 3 will offer a comprehensive framework in order to foster SI.

Table 3 SI Model

<i>SI Element</i>	<i>Hypothesis</i>
Culture and Leadership	Culture open to change Supportive & visionary leadership
Exploration	Open innovation attitude Allocated time for non-core activities
Interface Mechanisms	Internal cooperation and knowledge sharing Collaborative relationships with established stakeholders
Metrics	Embedded long term goals and targets Team-based sustainability metrics

Skills and Talents	Diverse workforce Tailored training of employees
Governance & Decision-Making	Broad involvement in decision-making Including sustainability criteria in decision-making
Organizational Structure	Decentralized concentration of authority Skill-based hierarchy

This study has a number of limitations that we find important to discuss, and which lead to recommendations for future research. Firstly, although the hypotheses were built through both academic literature as well as case studies, the selection of case studies was not performed through predefined metrics. We were unable to use listings such as *The Global 100* (most sustainable companies) by Bloomberg, as a different definition of sustainability was used. However, by selecting the case studies based upon expert sustainability panels and general consensus of the respective organizations' innovative approach to sustainability we feel confident a valid selection was made.

Secondly, the foundation of the model as presented in this paper is systems theory. This is necessary in order to do justice to the complicated structures of companies. However because of this approach, an overlap can be observed between the various elements presented. As such, quantitative research might be hampered by the chosen foundation.

Finally, the model as presented in this paper is not yet tested quantitatively. It is still important to test the hypotheses as mentioned above and establish a relation between organizational capabilities and sustainability performance. Additionally, an interesting angle would be to seek a relationship between this type of organizational capabilities and financial performance, in order to provide further support for the financial viability of SI.

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