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EXPLORING SUSTAINABILITY-ORIENTED INNOVATION (SOI) CAPABILITIES IN INDONESIAN MANUFACTURING FIRMS

ABSTRACT

Although the studies on sustainability-oriented innovation (SOI) have grown significantly in the last decades, to date research on specific SOI capabilities required by the firm to be a more sustainable innovator is still under-explored. Capability-based perspective is revisited to become a foundation for this empirical study. Specifically, capability theories linked to innovation and sustainability fields involved, including innovation management capabilities (IMC), natural resource-based view (NRBV), and social RBV (SRBV) with dynamic capabilities as overarching theory. As the nature of this research is exploratory, a qualitative approach is employed uses semi-structured interviews to 33 owner and manager of manufacturing firms in Indonesia, supplemented by site visit and archival documentation for triangulation. The findings suggested that around half of the firms studied adopting SOI with an operational optimisation approach. It is found from the data that transition is exists between SOI approaches. Firms operating at a higher level of SOI approach have specific dynamics capabilities above baseline ordinary SOI capabilities (production, marketing, environmental and social) that help them become a more sustainable innovator. These SOI dynamics capabilities include capture SOI idea, proactivity to SOI opportunity, mechanism to implement SOI, stakeholder management for SOI, SOI governance, and SOI continual learning.

***Keywords:* Sustainability; Manufacturing; Dynamic Capabilities**

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INTRODUCTION

In the recent business environment, SOI has been attracting considerable attention in the era of the growing discussion over global warming and climate change (Adams, Jeanrenaud, Bessant, Denyer, & Overy, 2016; Fagerberg, 2018), the economic inequality, which is rising throughout the world at different levels and speeds (Facundo, Chancel, Piketty, Saez, & Zucman, 2017; Lim & Fujimoto, 2019), the demand for firms, as economic agents, to be more responsible in running their businesses (Mittelstaedt, Kilbourne, & Shultz, 2015), and the current tendency of the market to buy products from innovative brands, while also helping to maintain the natural and social environment (Unilever, 2017). The pressure on firms to take greater account of sustainability in their business comes from a wide range of stakeholders (Sarkis, Gonzalez-Torre, & Adenso-Diaz, 2010). Firms are made to respond to this pressure by adopting sustainability into their business practices, and including it as a critical part of the organisational competitiveness, not only in operational but also at the strategic thinking level (Porter & Kramer, 2006). Firms are forced to be able to innovate by rethinking their products, processes, organisations, and even business models by embedding sustainability as an integral part of their business (Nidumolu, Prahalad, & Rangaswami, 2009).

Interest of SOI in the literature has been marked by the increasing number of scholarly publications in this area over the last decade. Systematic reviews from Klewitz and Hansen (2014) and Adams *et al.* (2016) clearly show how SOI attracts more attention from researchers year on year. Among the influential publications of SOI at the corporate level are those from

Nidumolu, Prahalad and Rangaswami (2009) who argue that sustainability is a key driver for firms' innovation, and Hansen, Grosse-Dunker and Reichwald (2009), who were the first to introduce the term SOI in a scholarly publication.

Despite the growing attention in this area, research on SOI from the capability perspective is still underexplored. Adams *et al.* (2016) in their future research direction highlighted that SOI research from the capability perspective was a specific area that would be an important contribution to the SOI body of knowledge. Similarly, Klewitz and Hansen (2014, p.71) pointed out that, "Research could focus on the different capabilities at the firm level and competencies at the individual management level" and Dangelico, Pujari and Pontrandolfo (2017, p.490) have argued that, "...extant literature lacks a theoretically sound and empirically testable framework that can provide specific insights into green product innovation from a capability perspective." These different authors have signalled the need for SOI research at the firm-level from the perspective of capability. This study seeks to fill this gap by involving three specific theories; namely innovation management capability (IMC), natural resource based-view (NRBV), and social research-based view (SRBV). Thus, the aim of this study is to investigate the capabilities required to develop SOI at the firm-level.

In order to achieve this aim, it is important first to understand the existing firms' approach towards SOI. The SOI approach describes the overall attitude of a firm to innovation by integrating the element of sustainability. This understanding is needed to recognise the various unique patterns of SOI approaches. This is also useful for differentiating the firms' levels in approaching SOI. As explained by previous authors, for example, Adams (2016), a firm can approach SOI with a basic level called operational optimisation, or an intermediate level called organisational transformational, or an advanced level called systems building. Distinguishing

existing conditions will be useful later to find out the distinguishing characteristics in their capabilities, as well as the different barriers they face. Therefore, given the importance of identifying this SOI approach, the first objective of this study is to determine the firms' approaches towards SOI.

From an understanding of the firms' different approaches towards SOI, the specific capabilities that firms require to develop SOI, can be further identified. This is performed by identifying capabilities that exist in firms with a higher level of SOI approach, which do not yet exist in firms with a lower level of SOI approach. Capability is a '*firm's capacity to deploy resources*', while resource is '*stocks of available factors that are owned or controlled by the firm*'; (Amit and Schoemaker, 1993: 35). To study firms' capabilities thoroughly, it is critical to understand the structure of their hierarchical capabilities, because from established literature, it is known that organisational capabilities are comprised of several levels of hierarchies with ordinary, substantive or dynamic capabilities (Ambrosini, Bowman, & Collier, 2009; Collis, 1994; Watson, Wilson, Smart, & Macdonald, 2018; Winter, 2003; Zahra, Sapienza, & Davidsson, 2006). Identification of the specific capabilities for SOI is important to help firms to reach a higher level of SOI approach. From the aim, and those two key objectives, the research questions proposed in this study are: (1) How do firms' approach SOI? and (2) What specific SOI capabilities are required to be a more sustainable innovator?

LITERATURE REVIEW

Sustainability-oriented Innovation (SOI)

SOI is intersection between two well established discipline i.e. innovation and sustainability. Both are interdisciplinary terms that have their respective histories. Innovation

term originated from the word 'novation' in the field of law around the 13th century which mean renewing contract, and then in subsequent development used in the field of sociology, anthropology, politics, management, and economics (Benoit, 2008). As starting point when discussing innovation in economics and management, the common literature is Schumpeter (1983, originally 1934) who argued that innovation is the main cause of economic development. Sustainability term historically introduced in 1713 by von Carlowitz in the field of forestry with specific concern on wood production (Wiersum, 1995; Wilderer, 2007). In its development, its use extends to other fields which concerned with caring for the natural and social environment. Sustainability concept later received wide recognition since the publication of Brundtland report 'Our Common Future' in 1987 (WCED, 1987). The concept of sustainability is then simplified and interpreted as ensuring all humankind's action is not the triple bottom line (TBL) of economic, environmental, and social (Elkington, 1997).

More specifically, SOI is a combination of two specific viewpoint, namely eco-innovation and social innovation. An interest in eco-innovation, for example, is marked by a book from Fussler and James (1996) that offers one of the pioneer definitions of eco-innovation as a new product or process that gives value to the business but reduces the negative impact on the environment. From the perspective of social innovation, this idea has emerged from a long time back to the 19th century where Emile Durkheim promoted the importance of social regulation in the division of labour, then early 20th century when Max Weber examined the relationship of social order towards innovation (Idowu, Capaldi, Zu, & Gupta, 2013). In 2003, the Stanford Social Innovation Review was launched by the Center for Social Innovation Stanford (Phills Jr., Deiglmeier, & Miller, 2008).

Capability-based Perspective

The capability based theories or perspective, later known as the resource-based view theory (RBV) originated from scholars such as Wernerfelt (1984), Prahalad and Hamel (1990), Barney (1991), theorises that a firm's competitive advantage can be achieved by developing resources and capabilities which are valuable, rare, inimitable, and non-substitutable (Barney, 1991). To distinguish between resources and capabilities, resources is defined as '*stocks of available factors that are owned or controlled by the firm*'; capabilities is '*firm's capacity to deploy resources*' (Amit and Schoemaker, 1993: 35). The nature of capabilities is intrinsically embedded within organisation (Kogut & Zander, 1992). A resource is typically tradable, and can be divided into six types of resources including financial, physical, human, technological, reputational, and organizational (Grant, 1991). A capability is invisible asset which is intrinsically embedded in an organisation, is not tradable and is built through information development, carriage and exchange through human capital (Amit & Schoemaker, 1993; Itami, 1987; Kogut & Zander, 1992). To explore the capabilities of the firm in depth, it is important to understand the hierarchical structure of capabilities.

Hierarchical structure of capabilities

Based on established literature it is known that organisational capabilities formed from several levels of hierarchies (Ambrosini et al., 2009; Collis, 1994; Watson et al., 2018; Winter, 2003; Zahra et al., 2006). In all studies that discuss the capability hierarchy, there are consistently two main levels of capabilities: substantive capabilities and dynamic capabilities (Table 1).

Table 1 is about here

Substantive capabilities are defined as the firms' fundamental ability to produce the desired output, either tangible or intangible; while dynamic capabilities are higher-order capabilities to manipulate those substantive capabilities. Dynamic capabilities (Eisenhardt & Martin, 2000; Teece, 2007; Teece & Pisano, 1994) are also known as second and third categories, second-order capabilities, or first-order capabilities. Teece (2007) proposed three microfoundations of dynamic capability including sensing, seizing, and reconfiguring. Sensing is the ability to 'learn and sense, filters, shapes, and calibrate opportunities; seizing regarding 'structures, procedures, designs and incentives for seizing opportunities'; reconfiguring is 'continuous alignment and realignment of specific tangible and intangible assets' (Teece, 2007).

IMC, NRBV and SRBV

Innovation management capability (IMC) reflect the ability of the firm to practise innovation which consists of five main elements (Tidd & Bessant, 2013) including strategy (Dyer & Singh, 1998; Ramanujam & Mensch, 1985), process (Rothwell, 1992; Van de Ven, 1986), linkages (Chesbrough, 2003), organisation (Oke, 2007), and learning (Calantone, Cavusgil, & Zhao, 2002; Kogut & Zander, 1992). The firm's innovation strategy, according to Ramanujam and Mensch (1985), is reflected from firm's innovation goals (objectives), resource allocation towards innovative activities, behaviour to innovation risks, timing in delivering new products or processes to the market, and long term perspective. Process refers to how ideas are searched, developed, and commercialised to the market convincingly (Chakravorti, 2004). At the searching and development stage, technical capabilities play an important role (Adams, Bessant, & Phelps, 2006), while at the commercialisation stage, marketing capabilities play a vital role (Calantone & Di Benedetto, 1988). Linkages means connecting with the network and access to

different resources to get support in innovating (Tidd & Bessant, 2013). Organisation refers to the structure and culture that is conducive to innovation (Ekvall, 1996), and learning regarding the absorption and management of knowledge by firms in the form of both explicit or implicit knowledge (Nonaka & Toyama, 2003).

While innovation element of SOI is addressed by innovation management capabilities theory, the sustainability element is addressed by the natural resource-based view (NRBV) (Hart, 1995; Hart & Dowell, 2011) and social resource-based view (SRBV). NRBV emphasises the relationship of the firms with their natural environment. NRBV include pollution prevention, product stewardship, and sustainable development (Hart, 1995) which fifteen years later updated to four namely pollution prevention, product stewardship, clean technology, and base of the pyramid (Hart & Dowell, 2011). However, in its development, Hart and Dowel (2011) saw that research that studies between sustainable development strategy is "virtually non-existent" caused by the difficulty of defining sustainable development in a business context. Therefore, (Hart & Dowell, 2011) then substituted sustainable development into two other strategies, namely clean technology and the base of the pyramid.

Later, natural resource-based view considered insufficient because it does not yet include the social aspect. Natural resource-based view is then extended to SRBV (Tate & Bals, 2016) which include two strategies that is mission-driven approaches and stakeholder management. Mission-driven approach is a signal of commitment and consistency in maximising social and environmental benefits besides being profitable in business (Tate & Bals, 2016). Stakeholder management refers to connections to maximise support from broad stakeholders to succeed in the business value creation (Tate & Bals, 2016). Through SRBV, Tate and Bals (2016) argues that social dimensions that so far lagged behind in sustainability can be better addressed.

SOI Dimensions

In the literature, the prominent articles discussed firms' SOI approach are written by Nidumolu et al. (2009), Klewitz and Hansen (2014) with average 40.33 citations per year; and Adams et al. (2016) (all three highly cited in SSCI Web of Science). Other models discuss SOI approach with a more specific perspective, for example from disruptive innovation perspective (Kuokkanen, Uusitalo, & Koistinen, 2019; Metz, Burek, Hultgren, Kogan, & Schwartz, 2016); opportunities for innovation (Hall, Vredenburg and Review, 2003) and life cycle (Hansen, Grosse-Dunker and Reichwald, 2009). After exploring various SOI models that discuss firms' approach to SOI, this study uses SOI model from Adams *et al.* (2016) for the basis of analysis. This model is chosen for three reasons: generalisability, robustness and recentness.

In term of SOI dimensions, although there is a commonality between the three dimensions of SOI of Adams *et al.* (2016) with the literature on SOI approach, but not all of which discussed in the literature is covered in their three SOI dimensions. Therefore, this suggests the need for a synthesis based on the evolution of the literature to the present, which will allow future and present work to be carried out more holistically. Based on the synthesis of the evolution of the literature to the present, which is then linked to capability perspective as well definition of SOI, then obtained six SOI dimensions from this process.

Innovation focus. Since SOI is a subset of innovation, innovation focus is an integral part of SOI. In IMC (Tidd & Bessant, 2013), innovation focus is addressed through the element of 'strategy' that explains how innovation goals can be achieved through resource allocation as well its behavior and timing (Ramanujam & Mensch, 1985). NRBV and SRBV focus more on discussing strategies with respect to the sustainability so that their role is more on other

dimensions than innovation focus. Adams *et al.* (2016) found that the focus of this innovation could be ‘technical’ on the one hand, and ‘people’ on the other hand on a more sustainable firm.

Sustainability focus. Sustainability focus becomes the SOI dimension as a logical consequence of the innovation focus on the first dimension. Sustainability focus is inseparable from SOI -as with innovation focus- remembering SOI is intersection between innovation and sustainability. Sustainability focus in this study refers the extent to which triple bottom line of economics, environmental and social (Elkington, 1997) addressed in firms’ innovation.

Intra-organisational integration. This dimension reflects the extent to which SOI is diffused within the firm. In IMC it is mainly discussed in ‘organisation’ and ‘learning’ (Tidd & Bessant, 2013). ‘Organisation’ means a structure and culture that is conducive for people working together to innovate without divisional boundaries; learning includes commitment to the learning process by developing people within the company (Tidd & Bessant, 2013). In NRBV, this dimension is related to pollution prevention.

Extra-organisational integration. This dimension refers to the extent to which the firms’ relationship with parties in the wider system in facilitating changes that are systemic. This dimension is adopted either by IMC, NRBV or SRBV. In NRBV, it is discussed in ‘linkages’ related to the network and access to different resources to make the firm’s innovation successful; and ‘learning’ related to absorption of knowledge from outside organisation (Tidd & Bessant, 2013).

Ambidexterity. Ambidexterity refers to organisation orientation towards stage of innovation in terms of implementation (exploitation) or development (exploration) new product, process or organisation. In IMC it is addressed in ‘learning’ (Tidd & Bessant, 2013) which is a process for absorbing and managing knowledge internally and externally in order to explore new

areas either in product, process, or organisation Adams *et al.* (2016) argued that developing ambidextrous skills is one of the characteristics of firms in systems building which is the highest level in their SOI model.

Physical life cycle. This dimension refers to the emphasis of SOI on the physical life cycle that starts from the birth of the product to the end of product life (“cradle to grave”). This dimension extends the sustainability focus dimension by emphasising manufacturing lenses that produce tangible products. In IMC, it related with 'process' which discusses the broad innovation process from search, select, implement, and capture (Tidd & Bessant, 2013).

METHODOLOGY AND DATA

The nature of this research is exploratory, which is reflected in the research aim, objectives, and questions. It is in line with the fact that the research on sustainability-oriented innovation from a capability perspective is still under-explored (Adams et al., 2016; Dangelico et al., 2017). Regarding the context, this exploratory nature is also reflected in the lack of empirical studies from emerging economy's context (Adams et al., 2016; Klewitz & Hansen, 2014; Watson et al., 2018). This nature is best approached using a qualitative strategy to address the phenomena effectively (Silverman, 2013).

Data collection. The specific form of data collection used for this research is semi-structured interviews. Unlike everyday conversations, qualitative research interviews are prepared and conducted to collect data relevant to research questions that ultimately aim to generate knowledge (Brinkmann, 2018; Saunders, Lewis, & Thornhill, 2016). To guide semi-structured interview, interview schedule is developed. It has been tested and subtly refined following the pilot study in the early 2018. The initial part of the instrument contained questions

about general information of the firm. Then they were asked their opinion about the innovation, sustainability, and capabilities that might be required for sustainability-oriented innovation with questions mainly adapted from underlying theories of this research, including IMC (Tidd & Bessant, 2013), NRBV (Hart, 1995; Hart & Dowell, 2011), and SRBV (Tate & Bals, 2016). They were also asked about the barriers to developing sustainability-oriented innovation in their firm. To improve the rigorousness and reliability of data, site visits, talk with people outside the firm (such as government agencies, association, and university experts) and collecting archival documentation also performed. The use of multiple sources of evidence is used to establish construct validity (Yin, 2014: 45), improve reliability (McCutcheon and Meredith, 1993: 246), and obtain holistic understanding (Jick, 1979: 63).

This empirical study focuses on manufacturing firms in Indonesia. The manufacturing sector become focus of this study due to their considerable impact on the economic, natural and social environment of a country. More specifically, we emphasise on manufacturing industries that are of top priority for Indonesia from 2015 to 2035 based on regulation No. 14 of 2015 (Government of Indonesia, 2015) namely (a) food and beverages industry, (b) textile, leather, footwear, and multifarious industry, and (c) other priority industries including pharmaceuticals, cosmetics, and medical devices, automotive industry, and electronics and ICT.

Indonesia is an interesting context for sustainability-oriented innovation research. In the reviews of Klewitz & Hansen (2014), Adams et al. (2016), or Watson et al. (2018) the emerging economies context is under-represented, with none of the studies discussed Indonesia. As one of the fourth largest major economies in the world after China, India, and the US, it represents a large market size. Indonesia, with its rapid economic growth, has not yet shown good performance in innovation and sustainability. This is reflected in its Global Innovation Index

ranking, 85th of 126 (Cornell University, INSEAD, & WIPO, 2018) and Country Sustainability Index ranking, 48th of 65 (RobecoSAM, 2018).

Participant in this research is owners or managers as the representative of their firm. Owner or manager is chosen as participants considering their knowledge of innovation as well sustainability in their firm. Owner or manager is a common participant selected as informants for qualitative research in management, including in studies of SOI (e.g. Nidumolu, Prahalad and Rangaswami, 2009; Metz *et al.*, 2016; Inigo and Albareda, 2019). To choose participants, the strategy used is purposeful sampling (Patton, 1990). In constructing samples, views from the sample with diverse characteristics in terms of industry and sizes are elaborated. Industrial classification is based on manufacturing industry grouping according to regulation No. 14 of 2015 (Government of Indonesia, 2015). Firm size refers to the Enterprise Survey (The World Bank, 2015) where a small firm is defined as a firm with 5 to 19 employees, a medium 20 to 99, and large more than 100 employees.

Data analysis. Before data analysed, data preparation and familiarisation are required. This preparation and familiarisation process is carried out through transcription and translation. For the first research question about SOI approach, the data is analysed using a polar (or radar or spider) chart which developed based on literature review (Figure 1). The chart shows the mix of all six SOI dimensions (innovation focus (IF), sustainability focus (SF), intra-organisational integration (IN), inter-organisational integration (OU), ambidexterity (DX), and physical life cycle (LC)) and three SOI approaches (operational optimisation, organisational transformational, and systems building). In each firm, their approach is analysed in each dimension and finally drawn using the polar chart. The use of such techniques has been used by previous researchers in

the fields of innovation and SOI, for example Tidd and Bessant (2009) and (Carrillo-Hermosilla, Del Río, & Könnölä, 2010).

Figure 1 is about here

For the second research question on SOI capabilities, collected data were subjected to thematic analysis. Thematic analysis is a logical way to search for themes or patterns across datasets, and leads to rich descriptions, explanations, and theorisation (Braun & Clarke, 2006; Saunders et al., 2016). To ensure analytical rigor, approaches from Braun and Clarke (2006) is followed, and supplemented by visualisation of data structure technique from Gioia, Corley and Hamilton (2012). Braun and Clarke's approach is useful in helping along the thinking process during data analysis, which is then visually displayed in the form of a thematic map. The Gioia approach is very useful in showing links between data and themes in a systematic and transparent way. The computer-aided qualitative data analysis package NVivo 12 is used to assist the analysis.

Data. In total, 33 semi-structured interviews were conducted, each for average fifty-minute duration, involving 25 different firms. The semi-structured interviews were conducted mostly face-to-face (twenty-six out of thirty-three), and the remaining was carried out by Skype because of geographical distance or the interviewee's busy schedule. All interviewees gave their consent for the interview to be recorded. Besides recording the interviews, notes also made to record important points of the interviewees' views in answering the questions asked. Data was collected in two visits to Indonesia in the period March-April 2018, and October 2018-January 2019. A

summary of the sample composition (by industry and size) and interviewee profile can be seen in Tables 2 and 3.

Table 2 and 3 is about here

RESULTS

From the analysis based on SOI approach assessment framework (Figure 1), firms in the sample are spread in four approaches: operational optimisation, transition of operational optimisation and organisational transformational, organisational transformational, and transition of organisational transformational and systems building. Firm that fully adopts systems building approaches is not found.

Operational optimisation approach. Majority of firms approaching SOI with an operational optimisation approach (12 firms), that are Firm B, D, H, J, K, M, Q, R, S, T, U, and V. These firms approaching SOI minimally in all six dimensions. Efficiency and compliance are the main characteristics of firms at this level. In terms of innovation focus, full attention is given to technological aspects, especially to improve production efficiency (for example Firm B through the use of electric heaters, Firm K by means of electric wood planers and jointers, or Firm Q by way of use of a machine with a certain number of needles), and for compliance (for example Firm J to meet more strict regulation regarding industrial waste or Firm M through the use of air blower to reduce excessive dust in the production process).

“We are naming it embossed. Long ago, to make the embossed, it began with the sponge sheets, cut the pattern, put it in the oven, then press it, it took a long time. Along with the growth, we think we need to make the process easier, so I am improving it with the same result, cheaper cost, and faster, I am using the electrical heater device that's widely used for Screen Printing, faster.” (CEO, Firm B)

“In some other parts there have been a few innovations and additions in the equipment we use related to employee health for example we use a blower machine, long time ago when the buffing process we did not use appliances to suck dust which makes the work space dirty, with this appliance our work place becomes cleaner and more comfortable. Then we have additions to the sewing machine for pads.” (VP marketing and administration, Firm M)

Transition of operational optimisation and organisational transformational approach.

Transition between operational optimisation and organisational transformational (transition OO-OT) consist of eight firms: F, G, W, P, I, A, N, and E. These firms approaching SOI minimally at one or several SOI dimensions and approaches it more than minimal in one or several other dimensions. Two types of patterns found in this transition approach. Type 1 is firm that predominantly still in operational optimisation but are beginning to approach SOI higher in one to three (out of six) SOI dimensions. Type 2 is a firm in the transition that almost reached organisational transformational level that is indicated by more than three (out of six) SOI dimensions that have more than just minimal value. Type 1 is the dominant type in transition OO-OT (8 out of 9 firms).

“...in September the permit was issued, because previously there was a request from several stores there must be have license from health office, finally after September I immediately collaborated with modern markets... early January 2016 we have been working with some big retailers well from there at the beginning of the development I immediately pursued cooperation with a larger parties...” (CEO, Firm I)

Type 2 is seen in only one firm, namely Firm E. This firm has an advance approach than operational optimisation in five (out of six) SOI dimensions. Among those that stand out from Firm E are sustainability focus and inter-organisational integration as implied in the CEO’s expression.

“I collaborated with mushroom farmers in this city... because geographically the elevation is quite good to grow mushrooms... I have experience around 8 years to develop this business I can share it with college student... they are my partners to educate the society.” (CEO, Firm E)

Organisational transformational approach. Organisational transformational firms approaching SOI in a higher level in all dimensions than firms in operational optimisation and transition OO-OT. There is only one firm at this level that is the Firm O. The focus of this firm, both on innovation and sustainability, is more than just minimal. This firm innovated by producing leather bags and shoes hand-made with elegant and authentic design by the means of specific tanning process. Most products are sold in foreign markets. Something that is still rarely can be done by local firms with similar products and the same business scale.

“At first, we didn't have a showroom, then we make a small showroom, the more consumers who come here, finally we make bigger ones...The important thing is “low cost high profit”. And now location is not a problem, right? And accidentally, this location is also quite strategic because it is close to airport. --- I fixed the road, people came here comfortably... That's the point. From the very beginning I was an anti-mainstream. I want to be different, so it is more visible.” (CEO, Firm O)

Transition of organisational transformational and systems building approach.

Transition between organisational transformational and systems building (Transition OT and SB) consist of four firms: C, L, X and Y. These firms generally approach SOI in organisational transformational levels but in one or more dimensions take a higher approach. Firm L, X, and Y have distinctive value in intra-organisational integration dimension indicated by various advanced formal certification they implemented. For example, Firm Y which is engaged in milk processing has a variety of standardisation that makes them recognised by Indonesia Standardisation Agency as one of the role models in the application of standards in the industry.

we developed PSD, powder soft drink... Then the safety module is also very important, security at work. Then we have a module also ISO 9001, multi management system, and then ISO 22000, food security, which related to our food security... our laboratory has been accredited by ISO 17025, it allowed to issue a certificate of analysis. ” (Factory Manager, Firm Y)

Systems building approach. There is no firm in the sample that has adopted SOI with this approach. This approach is the most difficult because firms need to approach SOI with the highest level on all six SOI dimensions. A summary of the firms’ pattern in approaching their SOI is presented in **Error! Reference source not found.**

Table 4 about here

Regarding SOI capabilities, SOI capabilities found from the data can divided to two main categories: ordinary SOI capabilities and dynamic SOI capabilities. The process of identifying specific capabilities through several stages of development assisted by the use of thematic map from Braun and Clarke (2006). Figure shows the process of thematic map development.

Figure 2 about here

Ordinary SOI capabilities. There are three elements or ordinary SOI capabilities observed: production, marketing, and environmental and social. These capabilities are related to functions in business organisations. In the SOI context, without these capabilities, a company would not be able to implement SOI in terms of products, processes, or organisations.

Production is the first ordinary SOI capabilities. It refers to the firm’s technical capabilities in producing products. All of interviews show that all firms have deep technical capabilities in producing their products. So technical terms introduced by participant to researcher that arise naturally in almost all interviews. For example, when participant from Firm H which engaged in

the textile industry briefly explain the production process and illustrates the history of the development of machinery for production.

“As far as I know maybe the machine that we use is the fourth generation in weaving, WJL (water jet loom) machine. Actually, besides WJL, there is AJL (Air Jet Loom), it uses air power. Because it uses air, it has something like compressor to reserve air, which could release a big air pressure. Considering this city plenty of water, so we use WJL. All machines in our factory use WJL. That’s for our production short description.” (CEO, Firm H)

Marketing is the second ordinary SOI capabilities. It reflects the firms’ abilities to market their products. Participants from firm P for example said that “marketing must be intense so that we can continue to grow, right?” and a participant from Firm H said that “no need to think hard for operating, the thing we should think more about is marketing”. From interviews, it is known that some participants devote a considerable amount of time to this marketing activity, either offline or online, because it will determine the continuity of the firms. Besides promotions, marketing capabilities include an appropriate pricing strategy, and also packaging.

“That’s right, when we increase the price from 40 to 70 thousand (Rupiah)... People interested. They realised that the price is oh yes, its packaging means this and that. So, it’s innovation on marketing, isn’t it? Yes, so we had different market. ” (CEO, Firm A)

Environmental and social is the third ordinary SOI capability is environmental and social. It is found that firms’ capabilities in dealing with these sustainability aspects included in ordinary capabilities, not dynamic. This is because all firms in the sample are registered firms, which when registered are required to have the ability to manage waste that has the potential to pollute the environment. This means that the ability to deal with these environmental aspects is a standard that must be met by the firms. For example, as expressed by participant from Firm A.

“We are a registered business, we have industrial permit, production permit, health, the environmental impact analysis (AMDAL) must be verified too.” (CEO, Firm A)

Dynamic SOI capabilities. Dynamic SOI capabilities which is the specific capabilities that can bring the firm beyond compliance. Therefore, it is explored mostly from the firms with high SOI approaches such as organisational transformational (Firm O), and transition of organisational transformational and systems building (Firm C, L, X, and Y. These capabilities differentiate these firms from other firms with a lower SOI approach (operational optimisation, and transition of of operational optimisation and organisational transformational. These capabilities consist of three categories that is SOI sensing, SOI seizing, dan SOI reconfiguring. The following is an explanation of each of these dynamic SOI capabilities.

SOI Sensing. SOI sensing reflects the firm’s ability to detect opportunities for sustainability-oriented innovation. In this study, it is found that SOI sensing included the capture of SOI ideas and proactivity to (follow up) SOI opportunity. *Capture SOI idea* refers to the ability to scan and detect the idea of developing SOI in the firm. Some firm show high sensitivity to SOI opportunities. Firm E for example, which saw the eating habits of Indonesians had been less healthy, began to develop healthy food in big cities as an opportunity to offer healthier food. It is found that the role of owner or top management in scanning and detection is highly dominant.

“But healthy food trends are starting to develop in big cities. Businesspeople will definitely produce the most consumed products. Finally, what is available is unhealthy products with the addition of monosodium glutamate and others that make the production cost can be reduced...” (CEO, Firm E)

Meanwhile, *proactivity to SOI opportunity* refers to proactivity to follow up on the idea of SOI that has been obtained. This is for example indicated by participant from Firm X that

proactively establishes in its vision and mission that they are a firm excels in innovation with the main principle of providing healthy and quality snacks for consumers. Another example is shown by Firm C which proactively visited various government and private offices to introduce its products based on local materials.

“One door closed, I find the other doors, I went to government offices, trade agency, agriculture, cooperatives. I introduced myself and introduced the products and expressed the vision and mission of this product to lift local rice.”
(CEO, Firm C)

SOI Seizing. SOI seizing reflects the firms’ ability to address potential SOI opportunities that sensed before. Seizing includes two specific capabilities that is mechanism to implement SOI and stakeholder management. *Mechanism to implement SOI.* This is a concrete process for following up on SOI ideas and opportunities that have been obtained. It is found there are two activities that prominent in this mechanism, namely external knowledge collaboration and experimentation.

“We are open, mostly with research institute because we are not doing research & development, we do development only. Research is too far, because it is close to invention, we are not doing invention, but we are innovating more to development. We cooperate with national institute of science, universities” (R&D Manager, Firm L)

As for *stakeholder management for SOI*, it refers to high-level routines in establishing relationships with stakeholders for their SOI development. It is found mainly three key stakeholders in this case, namely suppliers, government, and mass media. For relationships with suppliers, for example, carried out by Firm E.

“I did not plant the mushrooms, but I collaborated with mushroom farmers in this city, precisely in greater city area there are a lot of mushrooms farmers, because geographically the elevation is quite good to grow mushrooms...there were many mushroom farmers in this city there were hundreds or maybe thousands but we

cannot use the services of all farmers because it is constrained by its traditional processing...” (CEO, Firm E)

SOI Reconfiguring. Reconfiguring reflects the organisation’s ability to maintain its SOI. The two specific capabilities included in it are governance and continual learning. *Governance* for SOI refers to efforts to maintain SOI within the firm. Governance can be practiced through rewards and recognition as on Firm L. It can be also in the form of special teams and procedures for long-term relationships with local suppliers (Firm O). Firm X do it through formal inclusion of innovation and sustainability aspects in corporate strategic documents.

“Well, there is a company policy, the company policy is an official policy signed by the CEO Holding Company. There are 6 points... First, ensuring that the products produced are healthy, quality, halal and safe for consumption by customers... Now, the sixth, I had mentioned before, carried out corporate social responsibility that focused on balancing social and environmental financial performance.” (HR Manager, Firm X)

Continual learning refers to ability to continue learning so that SOI can be maintained and developed in the long term. This is in the form of high-level routines to improve competence through training, regular communication with experts, or internal learning. Firm X for example has a formal program for employee training.

“We provide training for employees in two large groups. One, in generic competence or soft skills, the second is technical competence... Formal, a syllabus made for one year, even though in the midst of having sudden impromptu training. For example, we come a new machine; automatically there must be a special skill.” (HR manager, Firm X)

Data structures for all SOI capabilities can be seen in Figure 3.

Figure 3 about here

DISCUSSION

This section discusses the research results in previous section linking it to the literature in the second section. With this discussion, it is expected that lessons learned will benefit the firms in developing SOI in their firms. From the analysis, it is found some interesting insights.

The first research question asked is "How do firms' SOI approach?" Around half of the firms studied (12 out of 25 firms) adopting SOI with an operational optimisation approach. The number of firms with operational optimisation approach is due to various reasons. As the first reason, operational optimisation approach is the easiest, relatively fully within the firms' control, and provides immediate short-term benefits. As the second reason many firms adopt SOI with operational optimisation approach is regarding the barriers these firms face. For SMEs within operational optimisation approach (9 out of 12 firms), the biggest perceived barriers are related to resource. Lacking desire from the firms to develop SOI further is the third reason many firms operating in the operational optimisation approach. This relates to lack of urgency because of no or insufficient demand from the market, the limited vision of the owner or the top management on SOI, as well as lack of ability to catch opportunities and develop ideas for further development of the SOI in their firms.

The finding that operational optimisation approach is the most widely adopted by the firm is something reasonable and not surprising. This is similar to the findings of systematic review of Adams et al. (2012) which found that dominantly from the empirical studies they reviewed (70 out of 100) discussed operational optimisation approach. However, this result is quite different with the findings of Metz et al. (2016) and Pace (2016) that found most of the firms they studied were at a higher level than the most basic approach (the latter two studies called it respectively 'beginning' and 'quick-fix innovators'). Further analysis shows this result

is understandable because the latter two studies (Metz et al., 2016; Pace, 2016) in their sample selection chose firms that were leading from the SOI side compared to the first study which more heterogeneous. In this study, all firms are formally registered, so that at a minimum they must comply with regulations related to environmental and social impacts when innovating with heterogeneous level of SOI approaches.

It is found from the data that transition exists between each three SOI approaches. The transition between SOI approach applies as the concept of transition in the World Economic Situation and Prospect (United Nations, 2019) which divides countries in the world into three broad categories of developed, transition, and developing economies based on their particular characteristics. The transition in SOI approach shows the approach in between two adjacent different approaches that have certain similar characteristics based on SOI dimensions. In a broader context, this is also in line with the socio-technical transition in the process of changing sustainability in innovation and technological change (Ramos-Mejía, Franco-Garcia, & Jauregui-Becker, 2018; Smith, Voss, & Grin, 2010; Truffer & Coenen, 2012).

Firm that adopts systems building approaches in their innovation is not found in the sample of this study. No firm with this approach shows how difficult it is to reach this level, even for large firms with their large resources. Referring to the literature, it is known that quite difficult to find publications that discuss firms with systems building approach. In the systematic review of Adams *et al.* (2012, 2016), none of the scientific publications they found discussed firms in the systems building approach. Example firms that adopted systems building approach is the “Benefit Corporation” or “B Corp” which emerged in the US in 2010 and is now known globally (Adams et al., 2016; B Lab, 2019a; Sharma, Beveridge, & Haigh, 2018). The B Corps is firm that “meet the highest standards of verified social and environmental performance, public

transparency, and legal accountability to balance profit and purpose” (B Lab, 2019a). At present there are more than 3,100 firms certified as B Corps which come from 150 different industries in 71 countries (B Lab, 2019b). The B Corp is still very rare in Indonesia, where currently there are only 3 firms from Indonesia that are certified by B Corp, out of 26.71 million firms in Indonesia according to the latest economic census (BPS, 2017). Therefore, it can be said, to be able to approach SOI with systems building approach is indeed a difficult thing, but not impossible. Because although it’s still very rare, there are some firms that have reached that level.

Related to industry it is known that industry II (textile, leather, footwear, and multifarious) is the most struggling to achieve a higher level of SOI approach. This can be due to the nature of Industry II, especially textiles, which have unique characteristics in terms of absorption of large workforce as well as complex environmental and social impacts (Boston Consulting Group & Global Fashion Agenda, 2018; Boström & Micheletti, 2016; Vajnhandl & Valh, 2014). Environmentally, this industry is one of the most polluted in the world and socially one of the most challenging, for example, concerning labor management (Boström & Micheletti, 2016). Such industries require large investments, especially when producing on a massive scale, also intensively consume energy and water (Vajnhandl & Valh, 2014).

The second research question asked is, "What specific SOI capabilities are required to be more sustainable innovators?" From the analysis it is found that different levels of SOI approach have different levels of SOI capabilities. SOI capabilities in the firms can be divided into two main categories namely ordinary SOI capabilities and dynamic SOI capabilities. The differences between firms operating with higher SOI approaches and firms with lower SOI approaches are found in their dynamic SOI capabilities. To be able to operate on a higher SOI approach, the firm need higher dynamic SOI capabilities.

SOI sensing is capabilities that open the way for SOI development in the firms. Specific SOI capabilities categorised as SOI sensing found from the data are capability capture SOI idea and capability to proactive to follow up SOI opportunity. Specific SOI capabilities categorised as SOI sensing found from the data are capability capture SOI idea and capability to proactive to follow up SOI opportunity. Capability to capture SOI idea is the ability to scan and detect the idea of developing SOI in the firm. This capability is determined by the strong vision of the owner or top management in developing SOI. The owner or top management's vision influences organisation culture to be willing to search and sensitive to SOI ideas (Biondi, Iraldo, & Meredith, 2002; De Medeiros, Ribeiro, & Cortimiglia, 2014; Klewitz & Hansen, 2014). In SRBV, this strong vision is called a mission-driven approach (Tate & Bals, 2016) where innovation is carried out not only for financial benefit but also for environmental and social benefits. The capability to be proactive in SOI opportunities requires considerable investment, both in the form of investment for R&D and for socialisation in the context of market sensing activity (Behnam & Cagliano, 2019; Demirel & Kesidou, 2019; Pace, 2016; Tidd & Bessant, 2013). Thus, sustainability leadership (Bhattacharya & Polman, 2017; Inigo & Albareda, 2019; Polman & Bhattacharya, 2016) spirit is crucial in this regard.

SOI seizing is capabilities “firms’ structures, procedures, designs and incentives for seizing opportunities to develop or implement of a new or improved product (good or service), process, or organisational method that creates environmental and/or social benefits in addition to financial return.” (Adapted from Teece, 2007). Capability in the form of the mechanism to implement SOI ideas are manifested in two mechanisms namely external knowledge collaboration mechanism and experimentation mechanism. External knowledge collaboration mechanism is a mechanism for working with outsiders to follow up SOI ideas until it can

actually be implemented or commercialised (not limited to initial sampling or testing anymore as in SOI sensing). In the literature, it is known as collaboration and co-creation (Aboelmaged & Hashem, 2019; Inigo & Albareda, 2019). Experimentation mechanism is an internal mechanism to process SOI ideas into implementation or commercialisation through the development of firms' own internal expertise (Iles & Martin, 2013). Capability of stakeholder management for SOI is among the most discussed in the SOI literature (see for example systematic review from Watson *et al.* (2018). The existence of capability of stakeholder management for SOI in firms with higher SOI approaches is much higher than firms with lower SOI approaches (5 of 5 firms or 100% compared to 11 of 20 firms or 55%).

SOI reconfiguring is “continuous alignment of specific tangible and intangible assets to develop or implement of a new or improved product (good or service), process, or organisational method that creates environmental and/or social benefits in addition to financial return.”

(Adapted from Teece, 2007). Specific SOI capabilities categorised as SOI reconfiguring found from the data are capability of SOI governance and capability of SOI continual learning.

Capability of governance for SOI can be realised the form of reframing business model by including sustainability (Inigo & Albareda, 2019) as well resource building and reconfiguration (Dangelico *et al.*, 2017). Furthermore, with strong governance for SOI, firms can build sustainable leadership that can influence and orchestrate norm in the wider ecosystems (Berkowitz, 2018; Inigo & Albareda, 2019; Mousavi & Bossink, 2017). Capability of SOI continual learning related to the ability to continuously learn to develop SOI. Learning here is mainly related to the formalisation of knowledge (Behnam & Cagliano, 2019) which can be in the form of policies for training or special R & D budget and team for SOI.

CONCLUSION

The first research question asked is "How do firms' SOI approach?" The most adopted approach by the firms is operational optimisation which is the lowest level SOI approach with main orientation towards compliance and short-term benefits of internal efficiency. Transition is existing between approaches which in between two adjacent different approaches that have certain similar characteristics based on their SOI dimensions. No firms with systems building approach found in the sample which is the highest level SOI approach indicated how difficult it is to reach this level, even for large firms with their large resources. From industry perspective, industry II (textile, leather, footwear, and multifarious) is the most struggling to achieve a higher level of SOI approach.

The second research question asked is, "What specific SOI capabilities are required to be more sustainable innovators?" The study findings' establish that integrating relevant theories in the capability perspective (innovation management capability (IMC), natural resource-based view (NRBV), and social resource-based view (SRBV) all of which are dynamic capabilities) are adequate to explain the capabilities needed for firms to become a more sustainable innovators. The differences are found in their dynamic SOI capabilities which consist of: (a) capture SOI idea, (b) proactivity to SOI opportunity, (c) mechanism to implement SOI, (d) stakeholder management for SOI, (e) SOI continual learning, and (f) SOI governance.

Contribution to knowledge

Academic contributions of this study are made in several ways. First, the use of capability perspective in this study is a follow-up on research direction suggested by previous researchers in the SOI field. As indicated by previous researchers (Adams et al., 2016; Dangelico et al.,

2017; Klewitz & Hansen, 2014), the use of theories from the capability perspective at the firm-level would provide important contribution to the SOI body of knowledge. The value of this study, in the building blocks of theory development (Whetten, 1989), is through its contribution to the building block of “What” by discover the specific capabilities required to improve a firm’s SOI performance. In addition, contributions to the building block "what" are also made in the identification of barriers to SOI which was explored empirically.

Second, in the journey of achieving research aim, this study conceptually has been able to synthesis six SOI dimensions based on the evolution of the literature to the present to allows present and future work conducted more holistically. The synthesis of SOI dimensions then combined with SOI approaches identified from the literature produced a SOI evaluation assessment framework which are valuable enhancement for SOI literature. Third, this study was conducted in a developing economy context that is still rarely explored in SOI literature. More specifically, based on the literature review as well review from previous researchers, none of published studies included in those reviews came from Indonesia. As discussed earlier, Indonesia is an important context that was overlooked. Study in this under-represented context in Whetten's (1989) building blocks of theory development, included in the building block of “Who, Where and When." Appreciation of the context, “Who, Where and When”, is part of the theoretical advancement (Whetten, 1989).

Implication to practice and policy making

Original contributions of this study for practitioners lie in some areas. First, this study is expected to be useful for firms to analyse their position in approaching SOI through SOI evaluation framework. Practitioners can look at the evaluation framework and assess themselves

on the six SOI dimensions in the framework. Second, insight in the form of SOI capabilities discussed in this study is expected to help practitioners understand the specific capabilities needed to become a more sustainable innovator. With this understanding, practitioners can identify improvement areas in their firms as well allocate their resources strategically to develop their SOI capabilities.

For the policy maker, the policy implications of this study mainly stand in two areas; assisting policy makers in evaluating the existing SOI conditions at firm-level and helping to identify the strategic role of policy makers to create a conducive atmosphere for firms in developing SOI. This study can help policy makers in evaluating the firms' existing conditions in developing SOI. Understanding of existing conditions is an important step for policy makers because Indonesia's desire to become an innovation and sustainable driven economy (Bappenas Indonesia, 2014; Indonesia Ministry for Economic Affairs, 2011) requires a clear picture of the existing conditions, as well the direction to be achieved. Without clarity of the existing conditions, then the policy is very likely to be ineffective and even counterproductive. The SOI approach patterns in section 4 that are built based on the SOI evaluation framework can provide policy makers with an overview of the specific patterns exhibited by firms in Indonesia.

Research strength, limitation, and future direction

This study innovatively combines the latest theory developments in capability perspectives (SRBV (Tate & Bals, 2016)) with the previous theories that have been established (IMC (Tidd & Bessant, 2009), NRBV (Hart, 1995), dynamic capabilities (Teece, Pisano, & Shuen, 1997) as the theoretical foundation. Although several studies have recently investigated SOI from capability perspective, to the best of knowledge, none of the published studies have

explored SOI capabilities with a combination of theories as used in this study. The use of these theoretical basis helps to identify the specific capabilities for firms to develop their SOI.

Although this study has contributed to SOI literature and has implications for practice as well as policy, we aware that our study has several limitations. This study focuses on manufacturing sector. More specifically, priority industries in Indonesia for 2015-2035 (Government of Indonesia, 2015). With this limitation, it should be noted that the results of the study may apply only to these specific sector and industries. The sampling in this study was carefully constructed in order to be able to represent the three industry and the three firms as designed. However, until the end of study, there is one cell that is not filled, that is firms in industry III with small size. The effort that has been done was snowballing by asking for recommendations from firms engaged in the same industry, also asking for recommendations from associations and stakeholders in those industry. With this limitation, the results of this study may not apply to these industry and size. The contextual limitation of this study is because this study was conducted in the scope of one country (Indonesia) the results cannot simply be extrapolated to the context of other countries.

As an exploratory study, this study provides ample opportunities for future research inquiries. Future research can be carried out in different sectors, i.e. service and agriculture. It also could be done in the manufacturing sector as this study, but in different industries than the three industry groups that are researched in this study. In time horizon, it is interesting to examine SOI phenomena longitudinally. From a capability perspective, the focus of the study can be directed to how the firms approaching SOI from time to time. Contextually, similar studies can be carried out in the context of other developing economies. developing economies that are used as context can be the six latest major emerging economies of BRIICS (Brazil,

Russian Federation, India, Indonesia, China, and South Africa) (OECD, 2016), or developing countries that are categorised as commodity exporters, or can even be carried out in the economies that are categorised as commodity importers (The World Bank Group, 2017) . The challenges to SOI in these countries can be similar or perhaps even higher than those faced by firms in Indonesia. Furthermore, comparative study can also be carried out in developed and developing economies context to advance the SOI literature.

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Table 1. Hierarchical structure of capabilities

Hierarchy	Terms and references
First level	Resource base (Ambrosini et al., 2009); substantive capabilities (Zahra et al., 2006); zero-level capabilities (Winter, 2003), first-order capabilities (Danneels, 2002)
Second level	Incremental dynamic capabilities (Ambrosini et al., 2009); dynamic capabilities (Zahra et al., 2006); first-order capabilities (Winter, 2003), second-order capabilities (Danneels, 2002)
Third level	Renewing dynamic capabilities (Ambrosini et al., 2009)
Meta level	Regenerative dynamic capabilities (Ambrosini et al., 2009); higher-order capabilities (Winter, 2003)

Source: adapted from Ambrosini, Bowman and Collier (2009) and Breznik and Hisrich (2013)

Table 2. Sample composition by sector and size

Size Industry	Small	Medium	Large	Total
I. Food and beverage	E(1) ² , I(1), <u>P(1)</u> ³ , R(2), S(1), U(1)	<u>A(1)</u> , <u>C(1)</u> , <u>V(1)</u>	<u>X(1)</u> , Y(1)	11 firms (12 interviews)
II. Textile, leather, footwear and multifarious	<u>B(2)</u> , <u>Q(1)</u>	<u>D(1)</u> , K(1), T(1)	<u>G(1)</u> , <u>H(2)</u> , <u>J(2)</u> , <u>M(1)</u> , <u>O(3)</u>	10 firms (15 interviews)
III. Other industry included in big five priorities in Indonesia ¹	-	<u>F(1)</u> , N(1)	<u>L(3)</u> , <u>W(1)</u>	4 firms (6 interviews)
Grand total	8 firms (10 interviews)	8 firms (8 interviews)	9 firms (15 interviews)	25 firms (33 interviews)

Note: ¹Other sectors including pharmacy, cosmetics, and medical devices industry, transportation industry, and electronics and ICT industry. Industry categorisation is based on Government of Indonesia (2015). Industry III has a relative high entry barrier compared to industry I and II. Therefore, it is difficult to find small firms in that sector. The effort that I have made is ask for recommendations from the larger firms in the industry, ask personal contact, and internet searching. However, small firms in those industry still cannot be obtained; ²In parentheses is the number of interview(s) in each firm; ³The firm with the bottom line indicates the site visit is carried out to the location of the firm. In a total, site visit was conducted to 16 out of 25 firms.

Table 3. Sample profile

Firms	Interviewees	Industry	Size	Establishment year	Mode of interview	Site visit
A	1: CEO	I	Medium	2004	Face-to-face	Yes
B	2: CEO; VP operations	II	Small	2000	Face-to-face; face-to-face	Yes
C	1: CEO	I	Medium	1975	Face-to-face	Yes
D	1: CEO	II	Medium	2009	Face-to-face	Yes
E	1: CEO	I	Small	2009	Skype	No
F	1: VP productions	III	Medium	1950	Face-to-face	Yes
G	1: HR & legal manager	II	Large	1981	Face-to-face	Yes
H	2: CEO; PPIC manager	II	Large	2007	Face-to-face: face-to-face	Yes
I	1: CEO	I	Small	2015	Skype	No
J	2: Marketing manager; HR & legal manager	II	Large	1995	Face-to-face; face-to-face	Yes
K	1: CEO	II	Medium	1999	Skype	No
L	3: R&D mgr; Operations mgr; Marketing mgr	III	Large	1974	Face-to-face; face-to-face	Yes
M	1: VP marketing & administration	II	Large	1989	Face-to-face	Yes
N	1: CEO	III	Medium	2009	Skype	No
O	3: CEO; VP; Marketing manager	II	Large	1997	Face-to-face; face-to-face; Skype	Yes
P	1: VP	I	Small	2001	Face-to-face	Yes
Q	1: CEO	II	Small	2003	Face-to-face	Yes
R	2: CEO, Marketing Manager	I	Small	2013	Face-to-face	No
S	1: CEO	I	Small	2012	Face-to-face	No
T	1: CEO	II	Medium	2000	Face-to-face	No
U	1: CEO	II	Small	2011	Face-to-face	No
V	1: CEO	I	Medium	1995	Face-to-face	Yes
W	1: VP Marketing	III	Large	2013	Face-to-face	Yes
X	1: HR Manager	I	Large	1958	Face-to-face	Yes
Y	1: Factory Manager	I	Large	2005	Skype	No
25 firms	33 interviews	I=12; II=15; III=6	S=10; M=8; L=15	-	26 face-to-face; 7 Skype	16 Yes; 9 No

Note: I = Food and beverage industry; II = Textile, leather, footwear and multifarious industry; III = Other sectors including pharmacy, cosmetics, and medical devices industry or transportation industry or electronics and ICT industry. All firms are manufacturing

Table 4. Summary of SOI approach pattern

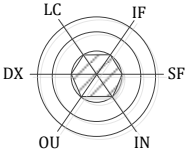

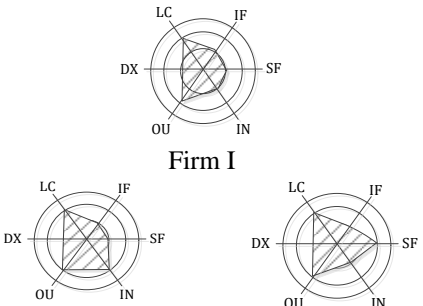
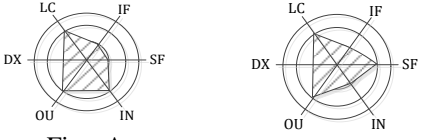
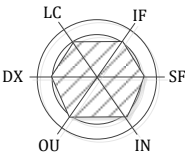
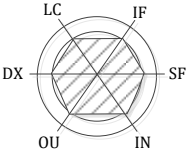
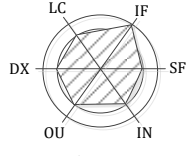
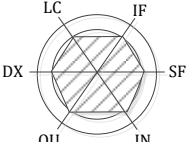
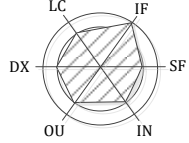
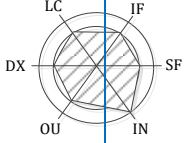
SOI approach	Operational optimisation	Transition of operational optimisation & organisational transformational	Organisational transformational	Transition of organisational transformational & systems building	Systems Building
<p>Firms and pattern</p>	 <p>Firm B, D, H, J, K, M, Q, R, S, T, U, and V</p>	<p><u>Type 1 (OO dominant):</u></p>  <p>Firm F, G and W</p>  <p>Firm P</p>  <p>Firm I</p>  <p>Firm A</p>  <p>Firm N</p> <p><u>Type 2 (OT dominant):</u></p>  <p>Firm E</p>	 <p>Firm O</p>	<p><u>Type 1 (OT dominant):</u></p>  <p>Firm C</p>  <p>Firm L, X</p>	<p>-</p>
Total	12 firms	8 firms	1 firm	4 firms	-

Figure 1 SOI approach assessment framework

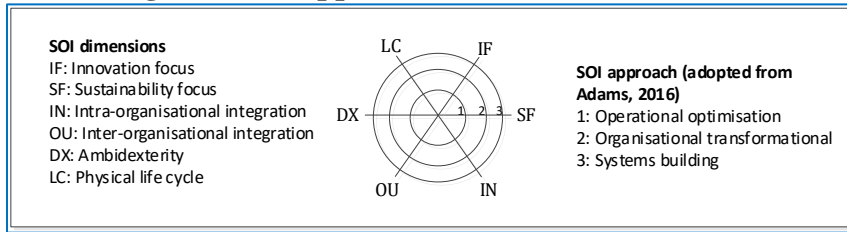


Figure 2. Thematic map of SOI capabilities

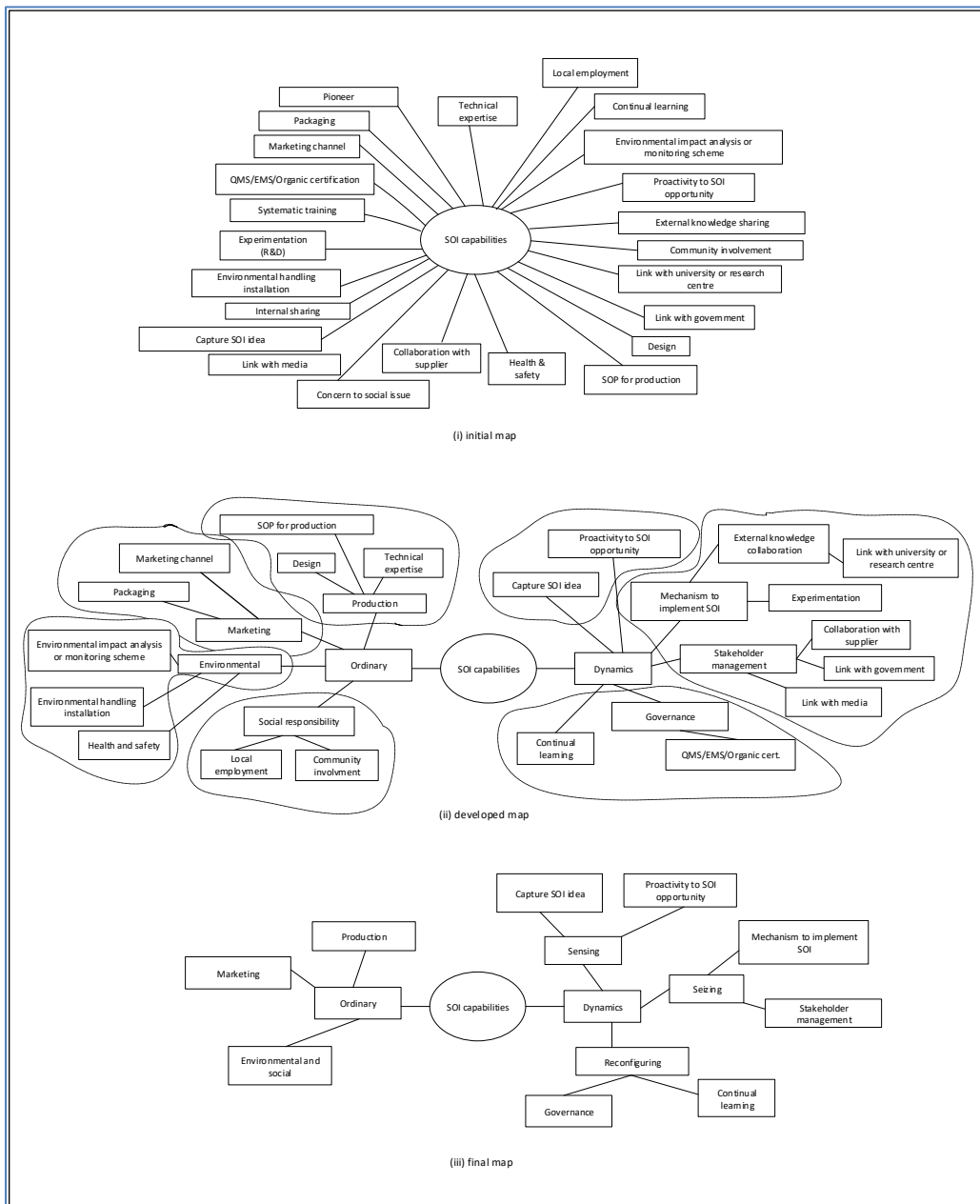


Figure 3. Data structure of SOI capabilities

