

Impact of meta-organization on environmental actions by manufacturing SMEs: A configurational approach

Sanne Bor (sanne.bor@lut.fi) and Anna Vuorio (anna.vuorio@lut.fi), LUT University¹

Summary

This paper suggests that meta-organizations are important for Small and Medium-sized Enterprises (SMEs) to take environmental action. While literature on firms' sustainability, in particularly environmental actions have been identifying the importance of environmental orientation, green capabilities and opportunities, the importance of meta-organizational membership has not been studied previously. Literature on meta-organizations, however, have highlighted the role that meta-organizations play in sustainability transformation. That is, demanding change through self-regulation, or supporting change through education and advice or promoting interaction. Both demand and support may enhance the environmental orientation, green capabilities, and alertness to green opportunity recognition of SMEs, and may even compensate for those. By applying fuzzy-set Qualitative Comparison Analysis (fsQCA) to study 86 Finnish manufacturing SMEs, we show that indeed neither meta-organizations' impacts nor the company's motivation, ability or alertness alone results in a high number of environmental actions, but rather a configuration of these factors is needed. However, lack of motivation, ability and opportunity cannot be compensated with meta-organization impacts.

Introduction

Global demands for improved environmental sustainability have led to an increased emphasis on the development of environmentally sustainable practices by organizations. It has been recognized that manufacturing industries have a particularly high negative impact (Shankar et al. 2017), and these industries have been working to develop more sustainable practices for some time (Despeisse et al. 2012). Environmentally sustainable practices are practices aimed at mitigating the adverse environmental effects the product produced throughout its life cycle, including supply chains, design, manufacturing, logistics and recycling. While small and medium sized businesses are considered responsible for a significant proportion of global pollution (Caldera et al. 2018), they often lack resources and need support in implementing sustainable practices (Hoogendoorn et al. 2015). It thus is important to understand what impacts the level of sustainability actions and practices in small and medium sized manufacturing firms.

Previous research on behavioural change argues that for any behavioural change to take place one must have the capability and opportunity to exercise a new behaviour and the strength of the motivation for the behaviour needs to be higher than the motivation for any other behaviour (COM-B model, Michie et al., 2011; Willmott et al., 2021). Similarly, in business studies we

¹ Thanks goes to Ekaterina Albats, Henri Hakala, Sanna Heinänen, and Chukwuka Igboanua, and the anonymous reviewers at BAM for their comments on the earlier version of this paper. While we have not yet addressed all issues, we will utilize your comments when developing the paper further. And thanks also goes to the PackageHeroes project funded by the Strategic Research Council of Finland (grant nr. 320217 & 346598) for making the data collection possible.

have seen that the introduction of environmental practices is impacted by the firm's *capability* to take environmental actions, also called green capability (GC) (Chen & Chang, 2013, Khan, et al., 2023). In addition, the firms also need to have to recognize the *opportunity* for new practices or innovations to take actions (Ma et al., 2011). We call this alertness to green opportunity (GOP). And finally, it is important that the firm is *motivated* to take sustainability action for any change to take place. It is argued that firms are more likely to change their practices when they are more environmentally oriented (EO) (Mariadoss et al., 2016).

Another stream of literature, that of meta-organization (studying organizations of which other organizations are a member, Ahrne & Brunsson, 2008), argues that membership of meta-organizations may be important for firms' capability to take sustainability actions (Berkowitz, 2018). Also, meta-organizations are argued to play an important role in sustainability transitions by either providing support or regulating their members, or even a whole field (Bor & O'Shea, 2022), helping their members to navigate between adaptation and transformation (Kundurpi et al., 2021). However, this literature has mainly drawn on case studies, often single cases, of meta-organizations (Berkowitz & Bor, 2018) and yet lacks quantitative evidence. In addition, the study of environmental action and performance has not looked at whether and how meta-organizations actually may impact the level of sustainability action by their member firms.

In this study, we therefore set out to identify which factors enable or hinder firms' implementation of environmental actions. Moreover, we especially focus on whether indeed meta-organization support or its demand for sustainability changes are important to reach a high level of environmental action. For this study, we gathered a dataset from 86 Finnish manufacturing SMEs. We use fuzzy-set Qualitative Comparison Analysis (fsQCA) to analyse the data. "Set-theoretic methods such as fsQCA are uniquely suitable for testing typological and configurational theory because they explicitly conceptualize cases as combinations of attributes and emphasize that it is these very combinations that give cases their uniqueness." (Fiss, 2012, p. 401).

The contribution of the study is threefold. First, we contribute to the literature on meta-organizations by showing that indeed meta-organizations are, through demands and support they give, a factor in the number of environmental actions by their member organizations. Second, we contribute to the sustainable SME transformation and entrepreneurship literature by identifying three distinct configurations that are connected to a high number of environmental actions, and 5 configurations that are associated with a low number of environmental actions. Third, we show that neither motivation, ability nor opportunity alone is enough to bring about a high number of sustainability actions, but rather they should be accompanied with meta-organization impacts.

Theory

Environmental action of SMEs and their drivers

Manufacturing firms have a wide range of actions they can take to improve their environmental performance and the impact of their products throughout their life cycle. Common environmental actions identified are those related to sustainable procurement (Esfahbodi et al., 2016; Shashi et al., 2018; Mariadoss et al., 2016), sustainable design (Esfahbodi et al., 2016; Melnyk et al. 2003; Shashi et al., 2018), sustainable distribution (Esfahbodi et al., 2016; Mariadoss et al., 2016), as well as circularity actions, such as remanufacturing (Henri and

Journeault, 2018; Melnyk et al., 2003). In addition, as part of the production process, waste recycling activities (Sroufe, 2003; Melnyk et al., 2003) and green human resource practices (Muisyo et al., 2021) are all seen as important environmental actions to ensure better environmental performance by manufacturing firms.

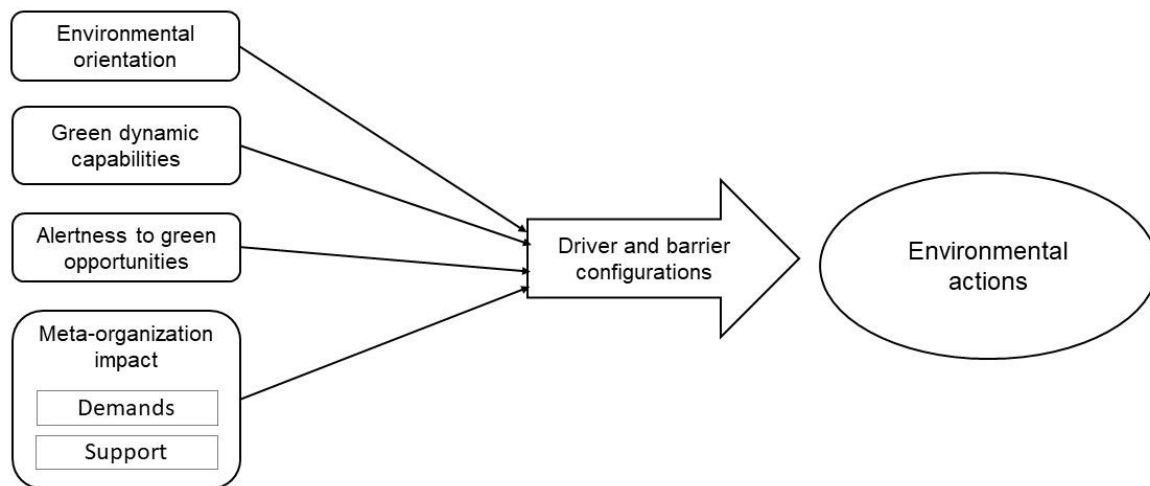


Figure 1: Theoretical model

It has been important to understand why firms take actions to improve their environmental performance. The theory of behavioural change suggests that one would need a combination of Capability, Opportunity, and Motivation for a behavioural change to take place (Michie et al., 2011; Willmott et al., 2021). These factors have also been considered important for firms to take environmental action. They will be discussed in little more detail below.

The dynamic capabilities are the company’s ability to combine, develop and transform internal and external competences to respond to changes in uncertain environment in order to sense and shape opportunities and threats, seize opportunities, and sustain competitive advantage (Teece et al., 1997; Teece, 2007). When these dynamic capabilities are focused on the development of environmental practices or action these are called Green Dynamic Capability (Chen & Chang, 2013; Rehman et al., 2022). Building on Teece et al. (1997), Chen and Chang (2013) define green dynamic capability as “the ability of a company to exploit its existing resources and knowledge to renew and develop its green organizational capabilities to react to the dynamic market”. These dynamic capabilities are considered essential in firms’ sustainable transformation (Inigo et al., 2017; Bocken & Gerards, 2020) and performance (Eikelenboom & de Jong, 2019). Green dynamic capabilities have been found to have positive impact on a company’s competitive advantage (Qui et al., 2020), the financial performance of the firm (Khan et al., 2023) and green competitive advantage (Li & Chen, 2017). In addition, green dynamic capabilities are shown to positively impact the market performance directly and indirectly through eco-design capability and green innovation capability (Dangelico et al., 2017; Rehman et al., 2022).

While linked to the dynamic capability, the ability to recognize opportunities (Ma et al., 2011; An et al., 2018) is necessary before one can seize the opportunities. And thus, the ability to recognize opportunities for developing new environmental practices or taking environmental action is important as well. We conceptualize this as alertness to green opportunity. While previous research on opportunity recognition is largely focused on the recognition of entrepreneurial opportunities more generally, we consider this ability to recognize opportunities for environmental action important as well.

Finally, motivation is considered important for firms to take environmental action. In this research we consider the environmental orientation (EO) (Mariadoss et al., 2016) of a firm as a sign of such motivation. Previous research in the context of green supply chain management has shown that environmental concern (motivation) has a positive impact on green practices through resource allocation, strategic focus on green supply chain and management support (Liu et al., 2020).

The role of meta-organizations in making this happen

In addition to these common factors that have been considered important, we note that firms are often supported by other organizations and may also be motivated by demands for changes by an industry association or an environmental standard. This argument, flowing from the meta-organization literature, has previously not been connection to studies of environmental action or performance by firms. The literature on meta-organizations argues that organizations, including firms, are regularly a member of one and often of more meta-organizations such as industry associations or business associations. Meta-organizations may be set up to create a new actor in the field, to change the interaction among the members, or create a collective identity or status (Ahrne & Brunsson, 2008). Meta-organizations are considered playing an important role in sustainability transitions by either providing support or regulating their members, or even a whole field (Bor & O'Shea, 2022). In relation to the support meta-organizations may provide, the literature highlights that membership is considered important for firm's capability to take sustainability actions (Berkowitz, 2018).

A meta-organization may facilitate knowledge transfers and collective learning (Berkowitz, 2018) by ensuring the possibility to exchange information and knowledge (Karlberg, 2019). They may also help members tackle sustainability issues, for example, through collectively developing responses to social or environmental challenges (Berkowitz & Bor, 2018) and they may help by coordinating action of members (Cropper & Bor, 2018). In addition to the support meta-organizations may provide, the literature has also identified that meta-organizations may push member organizations, i.e. demand change, by producing reporting mechanisms (Berkowitz, 2018), pushing their members to develop certain practices or adopt certain structures at the company level (Garaudel, 2020) by co-constructed rules, either as a new standard (Ahrne & Brunsson, 2008) or broader regulatory frame (Berkowitz & Souchaud, 2019) and then reinforcing compliance to such rules (König et al., 2012). Meta-organizations thus can affect their members (Ahrne & Brunsson, 2012). Although it is not the membership as such, but the engagement with the meta-organization that makes the difference. Member organizations may on the one hand make some of their resources available (e.g. for training for example) to get the support from meta-organizations (Bor and Cropper, 2023), and on the other hand the meta-organizations may ensure that member organizations comply to collective rules that are important to change the member firm behaviours (Ahrne & Brunsson, 2012).

Methodology

In this study we focus on Finnish manufacturing SMEs and do so because the social and environmental impacts of manufacturers and particularly manufacturing SMEs are substantial (Wang & Bansal, 2012; Williamson et al., 2006; Shankar et al. 2017). First, manufacturing firms play an important role on generating environmental impacts. Second, Finnish firms have often claimed to be forerunners in environmental sustainability, and Finland is considered very “meta-organized” as there are xx meta-organizations in Finland. Understanding which factors support and prevent the implementation of environmental actions among manufacturing firms is particularly relevant. The quantitative data collected for this study were gathered via telephone survey. The respondents interviewed were the key decision makers within the firms, in the context of our study this meant managing directors of the firm or the person responsible for sustainability at the management team level. Their perceptions are of significant influence within their organisations. Moreover, they have the essential knowledge to answer the survey questions related to the environmental actions, environmental orientation, green dynamic capabilities and the alertness to green opportunities. In addition, they are expected to know about their firms’ membership of meta-organizations and engagement with those.

We collected valid responses from 250 firms representing 19 industries in the manufacturing sector. Out of the 250 firms, 86 were able to name at least one meta-organisation, which they are a member of. These firms were asked to indicate what the meta-organisation does for them in relation to environmental questions, both in terms of demand for the firm to take action and in terms of the support they may have received.

Qualitative Comparative Analysis

Qualitative comparative analysis (QCA) is an analysis method that examines configuration of input variables to a specific outcome variable. In QCA, categorical variables are used to indicate a particular category (Thiem, 2015). This study applies fuzzy-set QCA, which enables an infinite number of degrees of memberships, thus forming a continuum of membership ranging between 0 and 1 (Dusa, 2024). QCA includes a following process: 1) calibration of dataset, 2) examination of necessity and sufficiency of conditions, 3) formation of truth table, and 4) systematic minimization to find configurations for a given outcome (Leppänen et al., 2019).

When calibrating the dataset, thresholds for raw data scores are set, which enable the determination of the “fully in” or “fully out” membership class of a given condition (Douglas et al., 2020). Given the nature of the data in the study (categorical), we used the totally fuzzy and relevant calibration technique. This calibration technique maintains the characteristics of the original data by following the distribution of the original data (Dusa, 2024). Next, the truth table was formed and following Ragin (2008, 118) a consistency threshold of 0.75 was used. Consistency depicts “the acceptable level of dissimilarity” within a configuration that is associated with the outcome (Douglas et al., 2020). Following Douglas et al. (2021) and Greckhamer et al. (2018) the frequency cut-off was set to two cases for a configuration and proportional reduction in inconsistency cut-off was set to 0.6.

Three types of QCA solutions, which are complex, parsimonious, and intermediate solutions, are recognized in the literature (Ragin & Sonnett, 2005). The first solution is called complex solution, and it bases only on empirical configurations of the observed data (Schneider & Wagemann, 2012). The second solution is called parsimonious solution, and it includes logical

reminders. These are theoretically possible configurations, called simplifying assumptions, and they enable to generate the simplest possible solution (Thiem, 2015). The third solution is intermediate solution, which uses both complex and parsimonious solutions. It relies only on easy counterfactuals as simplifying assumptions through directional expectations, i.e., hypothesizing about the direction in which each condition is associated with the outcome (Thiem, 2015). The directional expectations were set based on the theoretical considerations and results of the necessity analysis. We hypothesized that firms that are environmentally oriented, have green dynamic capabilities, and alertness to green opportunities are more prone towards taking more sustainability actions than those firms that lack these capabilities.

Measurement scales

Input variables

The measurement items for the environmental orientation, green dynamic capabilities, and alertness to green opportunities were derived from existing literature. All items were presented as statements, and respondents were asked to indicate their level of agreement or disagreement on a five-point Likert scale (1 = completely disagree to 5 = completely agree). See Table 1 for descriptive analysis of input variables.

Environmental orientation (EO) was measured through six items adapted from the scale developed by Mariadoss et al. (2016) and utilized by Shashi et al. (2018). Based on exploratory factor analysis, one item was omitted due to a poor fit (See Appendix 2) and an averaged summated scale was formed. The scale is deemed reliable (Cronbach's Alpha is 0.81).

The *Green dynamic capabilities* (GC) scale was adopted from Chen and Chang (2013). This measurement scale, adapted from the original scale by Pavlou and El Sawy (2011), consists of seven items reflecting the three aspects of green dynamic capabilities, which include sensing, seizing, and transforming. Based on an exploratory factor analysis, an averaged summated scale was formed, and the scale is deemed reliable (Cronbach's Alpha is 0.90).

Alertness to green opportunity (AGO) were measured via three items adopted from the opportunity recognition scale of Ma et al. (2011) and An et al. (2018), which combines the ability to recognize opportunities with the alertness to opportunities when they appear to exist. This is a reduced scale from the one originally developed by Singh (1998). We have adapted it to fit it to the environmental focus in our study. The scale is deemed reliable (Cronbach's Alpha is 0.85).

Meta-organisation demands (MOD) and *support* (MOS) for sustainability were evaluated through eleven items that were self-developed from the prior meta-organization literature (See appendix 1). The items reflect two aspects of meta-organization's influence on their members, demand through regulation (including standards) and support through training, expertise, and interaction with peers. The items were pre-tested with an expert panel on meta-organizations and modified based on their recommendations. Based on exploratory factor analysis, two averaged summated scales were formed. The first scale measures meta-organization demands for sustainability and consists of four items. The scale is deemed reliable since the Cronbach's Alpha is at good level (0.84). The second scale measures meta-organization support for sustainability and consists of seven items. The scale is deemed reliable since the Cronbach's Alpha is at the excellent level (0.92).

Output variable

Environmental action (EACT) was measured via index, which was formed based on 35 items covering six sets of environmental actions, namely green HR practices, sustainable design, sustainable distribution, sustainable procurement, waste recycling, and remanufacturing. Green HR practices were measured via four items developed by Muisyo et al. (2021). Based on an exploratory factor analysis, one averaged summated scale was formed. The scale is deemed reliable, since the Cronbach's alpha value is at good level (0.83). Sustainable design was measured via eight items adopted from Esfahbodi et al. (2016) and Melnyk et al. (2003). Based on exploratory factor analysis, three items were omitted due to a poor fit (See Appendix 2) and an averaged summated scale was formed. The scale is deemed reliable (Cronbach's Alpha is 0.76). Sustainable distribution was adopted from Esfahbodi et al. (2016) and consists of six items. An averaged summated scale was formed based on exploratory factor analysis, and the scale is deemed reliable based on Cronbach's Alpha value of 0.79. Similarly, sustainable procurement was measured via scale adopted from Esfahbodi et al. (2016), and it consists of six items. Based on exploratory factor analysis, one item was omitted due to a poor fit (See Appendix 2) and an averaged summated scale was formed. The scale is deemed reliable (Cronbach's Alpha is 0.79). Waste recycling, and remanufacturing were adapted from Melnyk et al. (2003). Waste recycling included six items, but based on an exploratory factor analysis three items were omitted due to poor fit, and averaged summated scales were formed. The scale is deemed reliable since Cronbach's alpha is at adequate level (0.65). Remanufacturing was measured via three items; however, based on an exploratory factor analysis, one item was omitted due to poor fit. An averaged summated scale was formed, and the scale is deemed reliable since the Cronbach's alpha value is at adequate level (0.68).

To formulate the index for environmental actions each of the six forms of environmental actions were dichotomised based on average values (1=above average, 0=average or below). The average values were the following: Sustainable HR practices 2.36, sustainable design 3.47, sustainable distribution 2.66, sustainable procurement 2.35, waste recycling 3.09, and remanufacturing 2.86. These were then combined by summing all six dichotomised actions together to form the environmental actions index, which ranges from 0 to 6.

Table 1: Descriptive analysis

	Mean	Median	St.dev.	CA	EO	GC	MO1	MO2	GOP
EO	3.64	3.80	0.77	0.81					
GC	3.23	3.29	0.82	0.90	0.49*				
MOD	2.59	2.50	1.04	0.84	0.20	0.32*			
MOS	2.93	3.00	0.92	0.92	0.21	0.45*	0.59*		
AGO	2.86	2.67	0.87	0.85	0.33*	0.72*	0.28*	0.41*	
EACT	3.06	3.00	1.99	-	0.53*	0.61*	0.41*	0.56*	0.55*

notes: * = $p < 0.05$

Results

First, necessity and sufficiency of conditions for high environmental actions were analysed. A condition is said to be necessary for an outcome variable if the consistency score is equal to or above 0.9 (Ragin, 2000). The results show that no single input variable is necessary for a firm

to implement high number of environmental actions. However, three distinct conjunctions of two input variables fulfil the consistency criterion for necessary conditions, and these include environmental orientation and green dynamic capabilities, environmental orientation and alertness to green opportunities, and meta-organisation demands for sustainability and alertness to green opportunities (See table 2 below). However, when examining the coverage (equal or above 0.62) and relevance (equal or above 0.5) of these conjunctions, only the first conjunction is considered as necessary for the outcome. These results are further supported by necessary condition analysis (See Appendix 3). The analysis based on the envelopment technique with free disposal hull (Dul, 2016), in which a condition is deemed necessary, when its effect size is equal or higher than 0.1. The results show that green dynamic capabilities (0.18) and alertness to green opportunities (0.18) are the only necessary conditions for high number of environmental actions. Similarly, the bottleneck analysis suggests that for very high number of environmental actions, green dynamic capabilities and alertness to green opportunities are necessary, while lower level of environmental orientation and meta-organization demand and support are also needed.

Table 2: QCA results for necessity (outcome = high environmental actions)

	Consistency	Coverage	Relevance
EO + GC	0.93	0.63	0.60
EO + AGO	0.94	0.61	0.56
MOD + GOP	0.93	0.60	0.55

notes: EO = environmental orientation, GC = green capabilities, AGO = alertness to green opportunity, MOD = meta-organisation demands for sustainability. Capital letters indicate presence (high level) of an input variable.

This suggests that for a firm to implement high number of environmental actions, it should either be environmentally oriented and have the capabilities to pursue green opportunities or alertness to green opportunities or be a member of a meta-organisation demanding for sustainability and alert to green opportunities. Thus, implying that firms should either have internal (push from environmental orientation) or external (pull from meta-organisation) motivation for environmental actions. However, this is not enough. The motivation should be accompanied by either ability (green dynamic capabilities) or opportunity (alertness to green opportunity) for a motivation to turn into action.

Next, sufficiency of conditions associated with high number of environmental actions were examined. The results show that there are three distinctive configurations, which are associated with high number of environmental actions (see Table 3). These configurations cover 65 percent of cases in the sample (solution coverage). The solution consistency is 0.78, which exceeds the threshold value of 0.75.

Table 3: QCA results for sufficiency (outcome = high number of environmental actions)

	Configurations		
	1 'Env. Developed'	2 'Env. Motivated'	3 'Externally Pushed'
Environmental orientation	●	●	

Green dynamic capabilities	●	●	●
Meta-organisation demands	●		●
Meta-organisation support		●	●
Alertness to green opportunities	●	●	●
Consistency	0.81	0.80	0.82
Coverage	0.54	0.54	0.57
Unique coverage	0.04	0.05	0.07
Solution consistency	0.78		
Solution coverage	0.65		

notes: Black circle (●) indicates a presence of an input variable. Absence of a circle indicates that an input variable is irrelevant for the condition.

Configuration 1 includes firms that are environmentally oriented, possess green dynamic capabilities, belong to a meta-organisation that demands actions for sustainability, and are alert to green opportunities. Hence, these firms have both internal and external motivation for taking environmental actions, which is accompanied by the ability and alertness to opportunities to implement those actions. We call firms in this configuration *Environmentally developed*. Configuration 2 consists of firms that are environmentally oriented, possess green dynamic capabilities, belong to a meta-organisation that supports actions for sustainability, and are alert to green opportunities. Hence these firms have internal motivation for taking environmental actions, which is combined with ability, and external resources from meta-organisation, and alertness to opportunities, which enable them to implement these actions. We call this configuration *Environmentally motivated*. Configuration 3 includes firms that have green dynamic capabilities, belong to a meta-organisation that demands and supports actions for sustainability, and are alert to green opportunities. Hence, these firms are externally motivated to take environmental actions, while they possess the ability and resources as well as recognise (are alert to) green opportunities to implement these actions. We call firms in this configuration *Externally pushed*.

Second, necessity and sufficiency of conditions for low environmental actions were analysed. The results show that no single input variable is necessary for a firm to implement low number of environmental actions. However, three distinct conjunctions of four to five input variables fulfil the consistency criterion for necessary conditions. However, although the coverage of these conjunctions is at an adequate level (above 0.6), their relevance is too low to be considered as necessary conjunctions for low environmental actions. The first necessary conjunction consists of a lack of environmental orientation, green dynamic capabilities, and meta-organisation demands for sustainability and a presence of meta-organisation support for sustainability. Hence, despite the meta-organisation providing resources for environmental actions, these actions cannot be implemented due to lack of motivation and ability. The second necessary conjunction includes lack of environmental orientation, green dynamic capabilities, meta-organisation demands and support for sustainability and alertness to green opportunities. The third necessary conjunction includes a lack of environmental orientation, green dynamic capabilities, alertness to green opportunities and meta-organisation support for sustainability, and presence of meta-organisation demand for sustainability. Hence, despite the meta-organisation providing motivation for environmental actions, these actions cannot be implemented due to lack of internal motivation, ability, and alertness to opportunities. See Table 4 below for details.

Table 4: QCA results for necessity (outcome = low environmental actions)

	Consistency	Coverage	Relevance
eo + gc + mod + MOS	0.92	0.64	0.40
eo + gc + mod + mos + ago	0.92	0.70	0.54
eo + gc + MOD + mos + ago	0.93	0.65	0.40

notes: EO = environmental orientation, GC = green capabilities, AGO = alertness to green opportunity, MOD = meta-organisation demands for sustainability, MOS =meta-organisation support for sustainability. Capital letters indicate presence (high level) of an input variable, lower case letters indicate absence (low level) of an input variable.

Next, sufficiency of conditions associated with low number of environmental actions were examined. The results show that there are five distinctive configurations, which are associated with low number of environmental actions (see Table 5). These configurations cover 72 percent of cases in the sample (solution coverage). The solution consistency is 0.84, which exceeds the threshold value of 0.8.

Table 5: QCA results for sufficiency (outcome = low environmental actions)

	Configurations				
	4 <i>Env. Underdeveloped</i>	5 <i>Resource- ladders</i>	6 <i>Supported motivation- ladders</i>	7 <i>Ignorant Supported motivation- ladders</i>	8 <i>Ability- ladders</i>
Environmental orientation	○		○	○	
Green dynamic capabilities	○	○			○
Meta-organisation demands			○		○
Meta-organisation support		○	●	●	
Alertness to green opportunities				○	○
Consistency	0.92	0.87	0.85	0.91	0.93
Coverage	0.58	0.55	0.31	0.32	0.49
Unique coverage	0.04	0.03	0.02	0.01	0.01
Solution consistency	0.84				
Solution coverage	0.72				

notes: Black circle (●) indicates a presence of an input variable. White circle (○) indicates an absence of an input variable. Absence of a circle indicates that an input variable is irrelevant for the condition.

Configuration 4 includes firms that have low environmental orientation and lack green dynamic capabilities. Hence, these firms have neither the motivation nor the ability to implement environmental actions. We call firms in this configuration *Environmentally underdeveloped*. Configuration 5 consists of firms that do not possess green dynamic capabilities and are a member of a meta-organisation that does not provide support for environmental actions. Hence, these firms have neither the ability nor resources at hand to conduct environmental actions. We call firms in this configuration *Resource-ladders*. Configuration 6 includes firms that are not environmentally oriented and lack meta-organisation demands for sustainability, although they perceive meta-organisation support for sustainability. Hence, these firms have access to resources that support environmental actions, but it is not enough to overcome the lack of motivation for taking these actions. We call firms in this configuration *Supported motivation-ladders*. Configuration 7 consists of firms that are not environmentally oriented and lack

alertness to green opportunities, but they perceive meta-organisation support for sustainability. Hence, these firms have access to resources that support environmental actions, but it is not enough to overcome the lack of motivation and alertness to opportunities for taking these actions. We also call firms in this configuration *Supported motivation-laggers*. Configuration 8 includes firms that lack both green dynamic capabilities and meta-organisation demands for sustainability as well as alertness to green opportunities. Hence, these firms neither recognise green opportunities nor have green dynamic capabilities to do so, and this is not demanded by meta-organisation. We call firms in this configuration *Ability-laggers*.

Discussion and Conclusions

This paper provides a typology of firms with high environmental actions, and with low environmental action. We show which configurations of motivation, ability, and opportunity together with meta-organization impact are likely to result in either a high or low number of environmental actions among manufacturing SMEs. While the results highlight the importance of green dynamic capabilities, it should be noted that in line with the theory of behavioural change, they should be accompanied with motivation and opportunity. Moreover, lack of these three (motivation, ability, and opportunity) cannot be overcome with external resources or motivation. A summary of the typology is presented in table 6 below.

Table 6: Summary of the taxonomy

	Description
<i>Environmentally developed</i>	Environmentally oriented firms that have green dynamic capabilities and alertness to green opportunities. They also perceive external motivation from meta-organization demands for sustainability. The combination of motivation, ability and opportunity enables them to implement a high number of sustainability actions.
<i>Environmentally motivated</i>	Environmentally oriented firms that have green dynamic capabilities and alertness to green opportunities. They also have access to resources through meta-organization support for sustainability. The combination of motivation, ability, opportunity, and resources enables them to implement a high number of sustainability actions.
<i>Externally pushed</i>	Firms that have green dynamic capabilities and alertness to green opportunities. They also perceive external motivation from meta-organization demands for sustainability and have access to resources through meta-organization support for sustainability. Although the firms are externally motivated, they have the ability, opportunities, and motivation to implement a high number of sustainability actions.
<i>Environmentally underdeveloped</i>	Firms that lack both motivation and ability to conduct environmental actions.
<i>Resource-laggers</i>	Firms that lack the ability to implement environmental actions and do not have access to external resources to conduct those actions through meta-organization support.
<i>Supported motivation-laggers</i>	Firms that are not environmentally oriented but have access to external resources through meta-organization support. These firms either do not have external motivation from meta-organization demands for sustainability or they are also not able to recognize opportunities to conduct environmental actions.
<i>Ability-laggers</i>	Firms that do not possess the ability nor recognise opportunities to implement environmental actions. They also do not face external pressure to conduct environmental actions due to lack of meta-organization demands for sustainability.

Small and young firms have been considered to have a key role in sustainable transformation at industry level (Hockerts & Wustenhagen, 2010). This notion calls for research focusing on drivers and barriers of environmental actions in SMEs. However, prior research has not tended to examine firm-level motivation, abilities, resources, and opportunities together and often motivation is examined at the level of individual manager (see e.g. Gadenne et al., 2008; Jiang et al., 2018; Mady et al., 2023). By applying a configurational approach to examine drivers and barriers to environmental actions, this study contributes to the literature on SMEs' sustainable transformation and sustainable entrepreneurship by showing that green dynamic capabilities and alertness to green opportunities enable the implementation of a high number of environmental actions. Prior research has recognised the role of dynamic capabilities in driving sustainable transformation and performance (Dangelico et al., 2017; Inigo et al., 2017; Li & Chen, 2017; Eikelenboom & de Jong, 2019; Bocken & Gerards, 2020; Qui et al., 2020; Rehman et al., 2022; Khan et al., 2023). However, these are not enough by themselves, but rather they should be accompanied by internal motivation (environmental orientation) and/or meta-

organization demands and support, which provides both external push towards environmental actions as well as resources to implement those actions.

In addition, this paper shows that meta-organizations indeed play an important role in supporting manufacturing firms to take environmental actions. All sufficiency configurations for firms with a high number of environmental actions show the presence of either high meta-organization demand, high meta-organization support or both. However, when looking at firms with a low number of environmental actions all other factors measured are at low levels, the meta-organizational support can still be present at high level resulting in a low level of sustainability action (see Table 5). These results indicate that these meta-organizational actions are not sufficient on their own to result in environmental action by firms. The meta-organization actions could be mediated by the member firms' green capabilities and opportunities, though interestingly may compensate for the environmental orientation of the firm. In future research, it would be important to test this further on a larger and more diverse sample and see whether indeed this is the case.

References

- Ahrne, G., & Brunsson, N. (2008). *Meta-organizations*. Edward Elgar Publishing.
- Ahrne, G., & Brunsson, N. (2012). How much do meta-organizations affect their members? *Weltorganisationen*, September, 57–70. https://doi.org/10.1007/978-3-531-18977-2_3
- An, W., Zhao, X., Cao, Z., Zhang, J., & Liu, H. (2018). How Bricolage Drives Corporate Entrepreneurship: The Roles of Opportunity Identification and Learning Orientation. *Journal of Product Innovation Management*, 35(1), 49–65. <https://doi.org/10.1111/jpim.12377>
- Andersén, J. (2022). An Attention-Based View on Environmental Management: The Influence of Entrepreneurial Orientation, Environmental Sustainability Orientation, and Competitive Intensity on Green Product Innovation in Swedish Small Manufacturing Firms. *Organization and Environment*, 35(4), 627–652. <https://doi.org/10.1177/10860266221101345>
- Berkowitz, H. (2018). Meta-organizing firms' capabilities for sustainable innovation: A conceptual framework. *Journal of Cleaner Production*, 175, 420–430. <https://doi.org/10.1016/j.jclepro.2017.12.028>
- Berkowitz, H., & Bor, S. (2018). Why Meta-Organizations Matter: A Response to Lawton et al. And Spillman. *Journal of Management Inquiry*, 27(2), 204–211. <https://doi.org/10.1177/1056492617712895>
- Bocken, N.M.P. & Geradts, T.H.J. (2020). Barriers and drivers to sustainable business model innovation: Organization design and dynamic capabilities. *Long Range Planning*, 53(4), 1-23. <https://doi.org/10.1016/j.lrp.2019.101950>
- Bor, S., & Cropper, S. (2023). Extending Meta-Organization Theory: A resource-flow perspective. *Organization Studies*, 44(12), 1939–1960. <https://doi.org/10.1177/01708406231185932>
- Bor, S., & O'Shea, G. (2022). The roles of meta-organisations in transitions: Analysing the food packaging cluster in Finland. In E. Lupova-Henry & N. F. Dotti (Eds.), *Clusters and Sustainable Regional Development A Meta-Organisational Approach* (pp. 143–159). Routledge. <https://doi.org/10.4324/9781003215066-13>
- Caldera, H. T. S., Desha, C., & Dawes, L. (2018). Exploring the characteristics of sustainable business practice in small and medium-sized enterprises: Experiences from the Australian manufacturing industry. *Journal of Cleaner Production*, 177, 338–349. <https://doi.org/10.1016/j.jclepro.2017.12.265>
- Chen, Y.-S., & Chang, C.-H. (2013). The Determinants of Green Product Development Performance: Green Dynamic Capabilities, Green Transformational Leadership, and Green Creativity. *Journal of Business Ethics*, 116(1), 107–119. <https://doi.org/10.1007/s10551-012-1452-x>
- Cropper, S., & Bor, S. (2018). (Un)bounding the Meta-Organization: Co-Evolution and Compositional Dynamics of a Health Partnership. *Administrative Sciences*, 8(3), 1–19. <https://doi.org/10.3390/admsci8030042>
- Dangelico, R.M., Pujari, D. & Pontrandolfo, P. (2017). Green Product Innovation in Manufacturing Firms: A Sustainability-Oriented Dynamic Capability Perspective. *Business Strategy and the Environment*, 26(4), 490-506. <https://doi.org/10.1002/bse.1932>

Despeisse, M., Mbaye, F., Ball, P. D., & Levers, A. (2012). The emergence of sustainable manufacturing practices. *Production Planning & Control*, 23(5), 354–376. <https://doi.org/10.1080/09537287.2011.555425>

Douglas, E. J., Shepherd, D. A., & Prentice, C. (2020). Using fuzzy-set qualitative comparative analysis for a finer-grained understanding of entrepreneurship. *Journal of Business Venturing*, 35(1), 105970. <https://doi.org/10.1016/j.jbusvent.2019.105970>

Dul, J. (2016). Necessary Condition Analysis (NCA): Logic and Methodology of “Necessary but Not Sufficient” Causality. *Organizational Research Methods*, 19(1), 10–52. <https://doi.org/10.1177/1094428115584005>

Eikelenboom, M. & de Jong, G. (2019). The impact of dynamic capabilities on the sustainability performance of SMEs. *Journal of Cleaner Production*, 235, 1360–1370. <https://doi.org/10.1016/j.jclepro.2019.07.013>

Esfahbodi, A., Zhang, Y., & Watson, G. (2016). Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance. *International Journal of Production Economics*, 181, 350–366. <https://doi.org/10.1016/j.ijpe.2016.02.013>

Fiss, P. C. (2011). Building Better Casual Theories: A Fuzzy Set Approach to Typologies in Organizational Research. *Academy of Management Journal*, 54(2), 393–420. <https://doi.org/10.5465/AMJ.2011.60263120>

Gadenne, D. L., Kennedy, J., & McKeiver, C. (2009). An Empirical Study of Environmental Awareness and Practices in SMEs. *Journal of Business Ethics*, 84(1), 45–63. <https://doi.org/10.1007/s10551-008-9672-9>

Garaudel, P. (2020). Exploring meta-organizations’ diversity and agency: A meta-organizational perspective on global union federations. *Scandinavian Journal of Management*, 36(1), 101094. <https://doi.org/10.1016/j.scaman.2020.101094>

Greckhamer, T., Furnari, S., Fiss, P. C., & Aguilera, R. V. (2018). Studying configurations with qualitative comparative analysis: Best practices in strategy and organization research. *Strategic Organization*, 16(4), 482–495. <https://doi.org/10.1177/1476127018786487>

Henri, J.-F., & Journeault, M. (2018). Antecedents and Consequences of Eco-Control Deployment: Evidence from Canadian Manufacturing Firms. *Accounting Perspectives*, 17(2), 253–273. <https://doi.org/10.1111/1911-3838.12168>

Hockerts, K. & Wustenhagen, R. (2010). Greening Goliaths versus emerging Davids - Theorizing about the role of incumbents and new entrants in sustainable entrepreneurship. *Journal of Business Venturing*, 25(5), 481–492. <https://doi.org/10.1016/j.jbusvent.2009.07.005>

Hoogendoorn, B., Guerra, D., & van der Zwan, P. (2015). What drives environmental practices of SMEs? *Small Business Economics*, 44(4), 759–781. <https://doi.org/10.1007/s11187-014-9618-9>

Inigo, E.A., Albareda, L. & Ritala, P. (2017). Business model innovation for sustainability: exploring evolutionary and radical approaches through dynamic capabilities. *Industry and Innovation*, 24(5), 515–542. <https://doi.org/10.1080/13662716.2017.1310034>

Jiang, W., Chai, H., Shao, J., & Feng, T. (2018). Green entrepreneurial orientation for enhancing firm performance: A dynamic capability perspective. *Journal of Cleaner Production*, 198, 1311–1323. <https://doi.org/10.1016/j.jclepro.2018.07.104>

Karlberg, E. (2019). Organizing the Voice of Women A study of the Polish and Swedish women's movements' adaptation to international structures. (PhD dissertation). Södertörn University.

Khan, S. A. R., Yu, Z., & Farooq, K. (2023). Green capabilities, green purchasing, and triple bottom line performance: Leading toward environmental sustainability. *Business Strategy and the Environment*, 32(4), 2022–2034. <https://doi.org/10.1002/bse.3234>

Kundurpi, A., Westman, L., Luederitz, C., Burch, S., & Mercado, A. (2021). Navigating between adaptation and transformation: How intermediaries support businesses in sustainability transitions. *Journal of Cleaner Production*, 283, 125366. <https://doi.org/10.1016/j.jclepro.2020.125366>

König, A., Schulte, M., & Enders, A. (2012). Inertia in response to non-paradigmatic change: The case of meta-organizations. *Research Policy*, 41(8), 1325–1343. <https://doi.org/10.1016/j.respol.2012.03.006>

Leppänen, P. T., McKenny, A. F. and Short, J. C. (2019). Qualitative comparative analysis in entrepreneurship: exploring the technique and noting opportunities for the future. In: B. Boyd, T.R. Crook, J.K. Lê and A.D. Smith (Eds.), *Standing on the Shoulders of Giants: Traditions and Innovations in Research Methodology*, pp. 155-177, Emerald Publishing <https://doi-org/10.1108/S1479-838720190000011010>

Li, Y-H. & Chen, Y-S. (2017). Determinants of green competitive advantage: the roles of green knowledge sharing, green dynamic capabilities, and green service innovation. *Quality and Quantity*, 51, 1663-1685. <https://doi.org/10.1007/s11135-016-0358-6>

Liu, S., Eweje, G., He, Q. & Lin, Z. (2020). Turning motivation into action: A strategic orientation model for green supply chain management. *Business Strategy and the Environment*, 29(7), 2908-2918. <https://doi.org/10.1002/bse.2580>

Madan Shankar, K., Kannan, D., & Udhaya Kumar, P. (2017). Analyzing sustainable manufacturing practices – A case study in Indian context. *Journal of Cleaner Production*, 164, 1332–1343. <https://doi.org/10.1016/j.jclepro.2017.05.097>

Mady, K., Battour, M., Aboelmaged, M., & Abdelkareem, R. S. (2023). Linking internal environmental capabilities to sustainable competitive advantage in manufacturing SMEs: The mediating role of eco-innovation. *Journal of Cleaner Production*, 417, 137928. <https://doi.org/10.1016/j.jclepro.2023.137928>

Mariadoss, B. J., Chi, T., Tansuhaj, P., & Pomirleanu, N. (2016). Influences of Firm Orientations on Sustainable Supply Chain Management. *Journal of Business Research*, 69(9), 3406–3414. <https://doi.org/10.1016/j.jbusres.2016.02.003>

Melnyk, S. A., Sroufe, R. P., & Calantone, R. (2003). Assessing the impact of environmental management systems on corporate and environmental performance. *Journal of Operations Management*, 21(3), 329–351. [https://doi.org/10.1016/S0272-6963\(02\)00109-2](https://doi.org/10.1016/S0272-6963(02)00109-2)

Michie, S., van Stralen, M., & West, R. (2011). The Behaviour Change Wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, 6, 42. <https://doi.org/10.1186/1748-5908-6-42>

Muisyo, P. K., Qin, S., Ho, T. H., & Julius, M. M. (2021). The effect of green HRM practices on green competitive advantage of manufacturing firms. *Journal of Manufacturing Technology Management*, 33(1), 22–40. <https://doi.org/10.1108/JMTM-10-2020-0388>

Pavlou, P. A., & El Sawy, O. A. (2011). Understanding the Elusive Black Box of Dynamic Capabilities. *Decision Sciences*, 42(1), 239–273. <https://doi.org/10.1111/j.1540-5915.2010.00287.x>

Qui, L., Jie, X., Wang, Y. & Zhao, M. (2020). Green product innovation, green dynamic capability, and competitive advantage: Evidence from Chinese manufacturing enterprises. *Corporate Social Responsibility and Environmental Management*, 27(1), 146-165. <https://doi.org/10.1002/csr.1780>

Ragin, C.C. (2008). *Redesigning Social Inquiry: Set Relations in Social Research*. Chicago: University of Chicago Press.

Ragin, C.C., & Sonnett, J. (2005). Between complexity and parsimony: Limited diversity, counterfactual cases, and comparative analysis. In S. Kropp and M. Minkenberg (Eds.), *Vergleichen in der Politikwissenschaft*, pp. 180-197. VS Verlag für Sozialwissenschaften.

Rehman, S. U., Bresciani, S., Yahiaoui, D., & Giacosa, E. (2022). Environmental sustainability orientation and corporate social responsibility influence on environmental performance of small and medium enterprises: The mediating effect of green capability. *Corporate Social Responsibility and Environmental Management*, 29(6), 1954–1967. <https://doi.org/10.1002/csr.2293>

Singh, R. P. (1998). *Entrepreneurial opportunity recognition through social networks* [Doctoral dissertation]. University of Illinois.

Schneider, C.Q., & Wagemann, C. (2012). *Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis*. Cambridge University Press.

Sroufe, R. (2003). Effects of Environmental Management Systems on Environmental Management Practices and Operations. *Production and Operations Management*, 12(3), 416–431. <https://doi.org/10.1111/j.1937-5956.2003.tb00212.x>

Teece, D.J., Pisano, G. & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal*, 18(7), 509-533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7<509::AID-SMJ882>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z)

Teece, D.J. (2007). Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*, 28(13), 1319-1350. <https://doi.org/10.1002/smj.640>

Thiem, A. (2015). Parameters of fit and intermediate solutions in multi-value Qualitative Comparative Analysis. *Quality & Quantity*, 49(2), 657–674. <https://doi.org/10.1007/s11135-014-0015-x>

Wang, T., & Bansal, P. (2012). Social responsibility in new ventures: Profiting from a long-term orientation. *Strategic Management Journal*, 33(10), 1135–1153. <https://doi.org/10.1002/smj.1962>

Williamson, D., Lynch-Wood, G., & Ramsay, J. (2006). Drivers of Environmental Behaviour in Manufacturing SMEs and the Implications for CSR. *Journal of Business Ethics*, 67(3), 317–330. <https://doi.org/10.1007/s10551-006-9187-1>

Willmott, T. J., Pang, B., & Rundle-Thiele, S. (2021). Capability, opportunity, and motivation: An across contexts empirical examination of the COM-B model. *BMC Public Health*, 21(1), 1014. <https://doi.org/10.1186/s12889-021-11019-w>

Zhu, Q., Sarkis, J., & Lai, K. hung. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International Journal of Production Economics*, 111(2), 261–273. <https://doi.org/10.1016/j.ijpe.2006.11.029>

Appendix 1: Meta-organisation items

Meta-organization demand

mo1	Saa meidät toimimaan ympäristön suojelemiseksi	Pushes us to take action to protect the environment
mo2	Vaatii meitä täyttämään vähimmäisympäristövaatimukset	Demands us to meet minimum sustainability requirements
mo3	Vaatii, että raportoimme säännöllisesti tekemistämme ympäristötoimista	Demands us to regularly report on environmental actions taken
mo4	'Kääntää' ympäristölainsäädännön seurauksiksi liiketoiminnallemme	Translates environmental legislation into consequences for our business

Meta-organization support

mo6	Tarjoaa erityisosaamista ympäristötoimiemme käytäntöön panon tueksi	Provides expertise supporting our implementation of environmental actions
mo7	Tukee meitä luomaan ympäristötoimia yhdessä toisten jäsenorganisaatioiden kanssa	Supports us to co-create environmental action with other member organizations
mo9	Tuottaa tietoa tarjolla olevista ympäristötoimista	Produces information about what kind of environmental actions are available
mo8	Tukee ympäristöinnovaatioiden kehittämistä	Supports the development of environmental innovations
mo10	Auttaa meitä ymmärtämään, mitä mahdollisia ympäristötoimia voimme tehdä	Helps us to understand which possible environmental action we can take
mo11	Tarjoaa mahdollisuuksia jaettuun mahdollisuuksien tunnistamiseen	Provides possibility for shared identification of opportunities

Appendix 2: Factor loadings for exploratory factor analysis

	Envir. orientation	Green dyn. capabilities	Meta-org. demands	Meta-org. support	Green opport.	Sust. HR	Sust. design	Sust. distribu.	Sust. procurement	Waste recycling	Remanu- facturing
eo 1*	(0.45)										
eo 2	0.71										
eo 3	0.69										
eo 4	0.74										
eo 5	0.50										
eo 6	0.70										
gc 1		0.72									
gc 2		0.83									
gc 3		0.77									
gc 4		0.70									
gc 5		0.71									
gc 6		0.79									
gc 7		0.77									
mo 1			0.64								
mo 2			0.75								
mo 3			0.85								
mo 4			0.55								
mo 5				0.77							
mo 6				0.81							
mo 7				0.76							
mo 8				0.71							
mo 9				0.69							
mo 10				0.88							
mo 11				0.78							
gopp 1					0.78						
gopp 2					0.74						
gopp 3					0.81						
eact 32						0.74					
eact 33						0.80					

eact 34						0.76					
eact 35						0.62					
eact 1							0.51				
eact 2							0.52				
eact 3*							(0.25)				
eact 4*							(0.40)				
eact 5							0.74				
eact 6							0.70				
eact 20*							(0.48)				
eact 31							0.62				
eact 13								0.69			
eact 14								0.59			
eact 15								0.59			
eact 16								0.56			
eact 17								0.70			
eact 18								0.57			
eact 7									0.55		
eact 8*									(0.44)		
eact 9									0.50		
eact 10									0.76		
eact 11									0.67		
eact 12									0.78		
eact 21										0.51	
eact 24										0.60	
eact 28										0.60	
eact 22											0.68
eact 23											0.62
eact 25*											(0.48)
eact 26*										(0.17)	(0.11)
eact 27*										(0.40)	(0.31)
eact 29*										(0.37)	(0.30)

Appendix 3: Necessary condition analysis

	EO	GC	MOD	MOS	GOP
Effect size	0.06	0.16	0.05	0.03	0.18
Sustainability actions					
0	0.0	0.0	0.0	0.0	0.0
10	0.7	1.0	0.0	0.0	0.0
20	2.1	4.6	0.0	0.3	0.0
30	3.5	8.3	0.0	1.2	2.1
40	4.8	12.0	0.5	2.1	8.8
50	6.2	15.7	2.9	3.1	15.4
60	7.6	19.4	5.3	4.0	22.1
70	8.9	23.1	7.7	4.9	28.7
80	10.3	26.8	10.1	5.9	35.4
90	11.7	30.5	12.5	6.8	42.0
100	13.0	34.2	14.9	7.7	48.7