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# The Relationship between Sustainability-Oriented Innovation Practices and Organizational Performance: Empirical Evidence from Slovenian Organizations

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**Background and Purpose** - The purpose of this paper is to empirically analyse the effects of sustainability-oriented innovation practices on the overall organizational performance. Further, this paper also aims to advance understanding of the measurement of corporate sustainability practices with the focus on innovation dimensions.

**Design/Methodology/Approach** - The study uses data obtained from a survey of 116 organizations encompassing both the manufacturing and service industries in Slovenia. Descriptive statistics were used in order to determine the level of sustainability-oriented innovation practices deployment. Exploratory factor analysis was applied to extract the underlying factors and to provide a basis for assessing their reliability and validity. In addition, regression analysis was used to quantify the effect of sustainability practices on the organizational performance.

**Results** - Data analysis result showed that sustainability-oriented innovation practices are significantly associated with organizational performance. Therefore, empirical evidence from this research confirmed the premise that building innovation competencies and integrating innovation activities in organization's processes lead to performance benefits. This contributes to the debate about the potential for organizations to be sustainable and competitive.

**Conclusion** - The presented research on corporate sustainability provides important theoretical and practical insights on which the deployment of sustainability-oriented innovation practices are conducive to fostering a broader set of performance benefits. As such, managers should increase organizations' capacity for innovation which can be beneficial in terms of performance implications and achieving sustainability goals.

**Keywords:** corporate sustainability, sustainability-oriented innovation, organizational performance, empirical study

## 1 Introduction

The role of business in society has been a concern both of scholars and practitioners for a long time (Salzmann et al., 2005). In this sense, Delai and Takahashi (2013) points out that sustainable development actions and initiatives have become vital aspects for any organization. A sustainable

organization is one that contributes to sustainable development by delivering simultaneously economic, social, and environmental benefits—the so-called triple bottom line (Hart and Milstein, 2003). Many authors have approached this issue by discussing the business case for corporate sustainability, including Dyllik and Hockerts (2002) and Salzmann et al. (2005). In general, the business case empha-

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sises that business processes directed at achieving sustainable development sense are necessary for the financial growth of an organization. The business case for sustainability is often used to provide motivations for an organization to integrate aspects of sustainability into business processes (Asif et al., 2011).

In addition, many studies have discussed the business case for a sustainability innovation (e.g. Wagner, 2008). In this regard, the challenge for business is to develop innovation strategies in order to respond to needs and expectations of a wide array of stakeholders (Ayuso et al., 2006) and at the same time justify economic rationale behind these sustainability activities (Schaltegger and Wagner, 2006). Furthermore, van Kleef and Roome (2007) suggest that developing competencies that foster innovation for sustainable development can be perceived as the basis of competitiveness. For example, these competencies can enable organizations to offer products and services that create value for customers and to generate new products and services, and therefore adapting to rapidly changing environment faster than competitors (van Kleef and Roome, 2007).

An improved understanding of the link between sustainability-oriented innovation practices and organizational performance does not just contribute to a debate about the business case for sustainability (Schaltegger and Wagner, 2006), but also contribute to the knowledge of measuring sustainability-oriented innovation activities (Pujari, 2006). However, few studies have empirically investigated the specific organizational performance outcomes concerning sustainability-oriented innovation.

Thus, the following research question is addressed in this study: Can an organization benefit by creating and deploying sustainability-oriented innovation practices? Therefore, this study adds to the emerging dialogue on corporate sustainability by empirically investigating the performance benefits of business activities that are directed towards sustainability through innovation.

The paper is structured as follows: firstly, the literature review that underpinned this research and the methodology employed to carry it out are presented in sections 2 and 3, respectively. Then, in section 4 empirical evidence on the relation between sustainability-oriented innovation practices and organizational performance is presented. In section 5, we conclude with a discussion of the results, implications, and issues for further research.

## 2 Literature review

### 2.1 Sustainability practices

Recognizing the multi-dimensional nature of sustainability, a rapidly growing literature documents a wide range of specific sustainability practices being implemented by organizations (see, for example, Hahn and Scheermesser,

2006; Collins et al., 2010; Maletic et al., 2011; Fairfield et al., 2011). One key starting point in the debate on sustainability management is the inclusion of stakeholders and the integration of their respective demands (Seuring and Gold, 2013), which is suggested to be a critical process that helps organizations to understand their key environmental and social impacts (Rocha et al., 2007). As far as corporate environmentalism is concerned, considerable attention has been paid in the literature to the eco-efficiency (Côté et al., 2006) in terms of reducing energy and material intensity, utilizing renewable energy sources, and in the context of emissions reduction of pollutants and waste minimization. Furthermore, apart from talking the environmental problems, many other practices aim at creating more sustainable workplaces by focusing on worker health and safety aspects, employee engagement, equity as well as quality of life (e.g. Hutchins and Sutherland, 2008). Employee centred sustainability practices are also related to the sustainability oriented organizational learning (Siebenhuner and Anold, 2007). Recently, literature has paid attention to the sustainability-related innovation practices, predominantly through the search of the ways on how to manage product development in a more sustainable way (Hallstedt et al., 2013).

Therefore, a number of fields, such as corporate environmentalism, corporate social responsibility, stakeholder, stakeholder theory and sustainable development, have contributed to the expansion of corporate sustainability literature. Due to difficulties in defining the concept of corporate sustainability as well as the multidisciplinary nature of sustainability, there are different approaches in conceptualizing and operationalizing sustainability constructs. One of the most commonly used measures are derived from established sustainability indexes, such as the SAM Dow Jones Sustainability Index, the KLD Social Index or the GRI performance indicators. Most of these sustainability initiatives are developed as a normative frameworks or process guidelines (Ligteringen and Zadek, 2005).

### 2.2 Organizational performance

The concept of organizational performance in literature refers normally to financial aspects such as profit, return on assets (ROA), return on equity (ROE) and economic value added (EVA). While financial measures of performance are among the most widely used by businesses, many researchers have criticized the short-term thinking and emphasize the importance of the non-financial components of performance measurement (e.g. Kaplan, 1983; Otley, 1999). Consequently, as a response to relatively narrow point of view of performance measuring, a more balanced approaches of performance measurement systems (PMSs) to include financial and non-financial performance measures, as well as explaining cause-and-effect relationships between the various measures, and providing better insight in terms of links between PMS and organization's

strategy have been proposed (Kaplan and Norton, 1996; Neely and Adams, 2000). Thus the two most well-known and frequently used models for performance management – the balanced scorecard and the European Foundation for Quality Management's (EFQM) Excellent Model - reflect the development. The key in developing these models is to construct the multiple organizational performance measures so that they are properly integrated and directed towards achieving organizational goals and strategy. Various Quality models, among others, Deming model and Malcom Baldrige model are some forerunners of the integrated performance management models of which focuses were paid in multiple performance variables. In line with these developments, Gomes et al. (2011) further suggest that organizations should (among other performance measures) also pay attention to softer performance measures, such as social responsibility. Based on corporate social performance and corporate financial performance, Fauzi et al. (2010) proposed a multi-dimensional concept of triple bottom line (TBL) as sustainable corporate performance.

Considering the academic perspective, a number of studies have applied different ways to measure organizational performance. As a result, different measures of overall organizational performance have been used to the same phenomenon, i.e. overall organizational performance. The most frequently used measures of organizational performance in empirical studies are financial performance, market performance, quality performance, product innovation, process innovation, operational performance and customer satisfaction (e.g. Lin and Kuo, 2011; Antony and Bhattacharyya, 2010; Fuentes-Fuentes et al., 2004). As pointed out by Tangen (2003), different performance dimensions may have to be combined to get a balanced and complete view of the organization's performance. For instance, Venkatraman and Ramanujan (1986) consider three aspects of performance, among them are financial performance, business performance, and organizational effectiveness and the later have been subsequently known as organizational performance. They suggested that a broader conceptualisation of the organizational performance would (in addition to financial indicators) include operational indicators as well when measuring the organizational performance. The operational indicators may include such measures as new product introduction, product quality, manufacturing value-added and marketing effectiveness.

## 2.3 Sustainability and innovation

As stated by Klewitz and Hansen (2013), the debate on organizations that strive to achieve the goals of sustainable development through innovation was initially focused on eco-innovations. In general, one can argue that eco-innovations include several dimensions, such as: design dimensions, user dimensions, product service dimensions, governance dimensions and the engagement of key stakeholders

in the innovation process (Carrillo-Hermosilla et al., 2010). The ultimate goal of putting efforts to eco-innovations is to provide new business opportunities and contribute to a transformation towards a sustainable society (Carrillo-Hermosilla et al., 2010). Generally, eco-innovations can be divided in the three main categories, as follows (Rennings et al., 2006):

- *Process innovations* enable the production of a given amount of output (goods, services) with less input. The latter can be interpreted in terms of the eco-efficiency (Côté et al., 2006) which aims to reduce the material and energy intensity. Process innovations can be further subdivided into innovations in end-of-pipe technologies and innovation in integrated technologies categories (Rennings et al., 2006).
- *Product innovations* encompass the improvement of goods and services or the development of new goods categories (Rennings et al., 2006). It is suggested that most of the sustainability-oriented product/service innovations relate to incremental or evolutionary innovation (e.g. remanufactured products, recycled content, organic cotton-based clothing, and water-based paints) (Pujari, 2006).
- *Organizational innovations* include new forms of management systems. This could also include environmental management systems (Poksinska et al., 2003). More recently, the trend has moved towards holistic sustainability management system standards and guidelines (Maas and Reniers, 2013).

Lately, the debate on sustainability and innovation has expanded its focus to include a wide range of themes such as sustainability-related innovation (e.g. Wagner, 2008; Klewitz and Hansen, 2013), sustainable innovation (Boons et al., 2013), CSR-driven innovation (e.g. Hockerts, 2008) as well as the discussion regarding the development of more sustainable management systems (Maas and Reniers, 2013).

## 3 Methods

### 3.1 Sample and data collection

A survey questionnaire was mailed to the managers of a random sample of Slovenian organizations. To ensure a reasonable response rate, the survey was sent in two waves. The questionnaire with the cover letter indicating the purpose and significance of the study was emailed to target respondents. Managers were chosen because they were considered to be familiar with the implementation of sustainability practices and performance indicators.

A total of 116 usable responses were received from a sample of Slovenian organizations. The profile of the organizations and respondents is provided in Table 1.

Table 1. Profile of the respondents in our sample

Sample distribution	Percentage	
Respondent profile	Middle management	38.6
	Frontline management	22.8
	Top management	21.1
	Data not available	17.5
	Total	100 (N=116)
Organization profile (employees)	0–5	6.0
	5–50	18.1
	50–250	31.9
	250–500	9.5
	over 500	26.7
	Data not available	7.8
<b>Total</b>	<b>100 (N = 114)</b>	

### 3.2 Measures

*Independent variables: sustainability-oriented innovation practices.* Although our study mostly used multi-item scales that were verified through various analyses, appropriate scale for sustainability-oriented innovation practices was not available. Hence, the domains of construct were identified via a thorough review of the literature. Several items were operationalized in relation to eco-innovation activities in product development process (e.g. Pujari, 2006), stakeholder integration in product development process (e.g. Seuring and Gold, 2013) as well as in relation to business process improvements (e.g. Côté et al., 2006).

The items measuring sustainability oriented learning and the development of competencies supporting innovation were developed based on the literature review related to sustainability and organizational learning (e.g. Lozano, 2011; Siebenhuner and Anold, 2007; van Kleef and Roome, 2007).

Therefore, a diverse range of operationalizations has emerged for the sustainability-oriented innovation practices. The complete items of these scales are presented in Table 2.

*Dependent variable: organizational performance.* While recognising that performance is multi-dimensional concept (Chenhall and Langfield-Smith, 2007), we designed our survey instrument to capture the most commonly studied dimensions of organizational performance. The organizational performance sub-constructs were operationalised by developing several items based on a literature review (e.g. Baird et al., 2011; Kaynak, 2003; Martensen et al., 2007; Prajogo and Sohal, 2003; Veleva and Ellenbecker, 2001; Hutchins and Sutherland, 2008). Therefore, we understand the concept of organizational performance to be composed of the following sub-constructs: financial and market performance, quality performance, innovation performance, environmental performance and social performance. A resulting

four-item scale captures the extent to which organizations achieve business success. A four-item scale measures quality performance and captures the extent to which organizations have improved quality of their products and services during the last 3 years and meet customer satisfaction. A four-item scale measures innovation performance in terms of product and process innovation. A four-item scale measures environmental performance and captures the extent to which organizations achieve efficiency of material and energy consumption. Finally, a four-item scale measures social performance from the employee perspective (satisfaction, motivation and turnover ratio). The corresponding items for measuring the organizational performance are presented in Appendix A.

## 4 Analysis and Results

### 4.1 Measurement and validation of constructs

*Sustainability-oriented innovation practices.* The scales for measuring sustainability-oriented innovation practices were subjected into validity and reliability tests. The construct validity was assessed merely using exploratory factor analysis (EFA) based on oblique rotation (Direct Oblimin). The scale reliability was tested by calculating its Cronbach's alpha. Additionally, we performed corrected item-total correlations (CITCs) in order to strengthen validity and reliability results. The results of the validity and reliability test are presented in Table 2. The result of factor analysis supports the validity of the two sub-constructs as indicated by the amount of variance explained which exceeded 50%, and the loading factors of all items within each scale exceeded 0.5 (Hair et al., 2010).

Table 2. Scale validity and reliability

Factor	Items	Factor loading	CITC
SOPPD	We consider sustainability as an opportunity for product/service differentiation	.974	.733
	Multiple departments (such as marketing, manufacturing, and purchasing) are working together on sustainability related initiatives	.761	.610
	The organization undertakes regularly business process reengineering with a focus on green perspectives	.753	.776
	The organization makes improvements to radically reduce environmental impacts of products and services' life-cycles	.714	.773
	Preliminary market assessments are made to obtain customers' view of green product ideas	.655	.626
	We search for external sources (e.g. partners, customers, research institutions) of knowledge in our search for innovative ideas related to sustainability	.643	.668
	*The organization is characterised by a learning culture stimulating innovation for sustainability	.532	.749
	*The business processes are flexible allowing us to achieve high levels of responsiveness towards key stakeholder needs and demands	.503	.374
	*The organization involves key non-market stakeholders issues (such as local communities, general public, governments and NGOs) early in the product/service design and development stage	.386	.473
	SOICD	We develop new competencies supporting innovation in the organization	-.931
We continuously try to strengthen innovation skills in key areas where we have no prior experiences		-.851	.755
The organization is constantly exploring new/different ways to understand the expectations and requirements of key stakeholders		-.814	.667
We acquire innovative environmental-friendly technologies and processes		-.656	.644
*The organization involves key market stakeholders (customers, suppliers) early in the product/service design and development stage		-.484	.496

\*Excluded from further analysis

SOPPD - sustainability-oriented process and product deployment

SOICD - sustainability-oriented innovation competencies deployment

As shown in Table 2, the results show two factors with eigenvalues greater than one, accounting for 58.168 % of the variance (K-M-O statistic 0.891; Bartlett statistic 898.029; significance 0.000). Thus, a model with two factors may be adequate to represent the data. To ensure a convergent validity a cut-off value of 0.6 and above is considered in this study. The first factor shows the variables having a common underlying dimension of 'sustainability-oriented process and product deployment (SOPPD)'. The main variables, which load heavily on this factor, are related to the eco-innovation activities in product development process as well in relation to innovative sustainability solutions in business processes. The second factor, named 'sustainability-oriented innovation competencies deployment (SOICD)',

includes the variables related to developing new knowledge and skills aiming to foster sustainability-related innovations.

The alpha coefficients have the acceptable value ranging from 0.85 to 0.89, with the lowest value for the variable SOICD and the highest value for the variable SOPPD. Therefore, the alpha value for each construct was well above the recommended value of 0.70, which is considered satisfactory for exploratory research (Hair et al., 2010). As shown in Table 2, the corrected item-total correlation scores range from 0.37 to 0.78. The rules of thumb suggest that the item-to-total correlations should exceed 0.5 (Hair et al., 2010). Accordingly, some items are considered to be excluded from further analysis (in table marked with an »\*«).

*Organizational performance.* Organizational performance measures were assessed via responses to the question ‘Please select the number (on a 5-point Likert-type scale) that accurately reflects the extent of your organization’s overall performance over the last three years on each of the following’. The following dimensions of organizational performance were included in the questionnaire: financial and market performance, quality performance, innovation performance, environmental performance and social performance.

In order to confirm the latent factor structure for measured variables, an exploratory factor analysis (EFA) was performed using the principal components analysis (PCA) with the Varimax rotation method. The results show five factors with eigenvalues greater than one, accounting for 69.961% of the variance (K-M-O statistic 0.869; Bartlett statistic 1497.571; significance 0.000). In order to guarantee the convergent and discriminant validity, the low loading items (< 0.6) were excluded from the subsequent data analysis. Factor loading of organizational performance items are presented in Appendix A.

### 4.2 Descriptive statistics

Prior to further statistical analysis, we first investigated the descriptive statistics for study variables. Means, standard deviations, and bivariate correlations are presented in Table 3. Observing the overall sub-constructs, we can see that the highest mean value corresponds to the SOICD (3.94), while the lowest value corresponds to the financial and market performance (3.21). However, respondents’ organizations appeared to be implementing sustainability-oriented innovation practices to a relatively strong extent (means of 3.89 and 3.94, respectively).

As expected, the results indicated positive relationships between sustainability-oriented innovation practices and all organizational performance dimensions, with correlations ranging from 0.32 to 0.56 ( $p < 0.01$ ). Furthermore, SOPPD shows the strongest correlation with the overall organizational performance ( $r = 0.543, p < .001$ ), and the lowest correlation with the financial and market performance ( $r = 0.315, p < .001$ ). Regarding the SOICD, the strongest correlation was observed in the case of overall organizational performance ( $r = 0.543, p < .001$ ), while the lowest value was found in the correlation between SOICD and environmental performance ( $r = 0.333, p < .001$ ).

### 4.3 Regression analysis

First, mean scores were calculated from the scale’s items to generate the composite scores for the organizational performance. This newly created composite variable was subsequently used in the regression analysis. Furthermore, the normality of the composite score was checked and the result indicated no major violation, with skewness and kurtosis values well within the accepted range ( $\pm 1$  and  $< 3$ , respectively). Additionally, the Kolmogorov-Smirnov test of normality supports the aforementioned arguments ( $K-S = 0.057, p = 0.200$ ).

Table 4 summarises the regression results for the effects of sustainability-oriented innovation practices on the organizational performance.

The results in Table 4 show that the overall regression model is significant with an F value of 33.047 ( $P = 0.000$ ). Furthermore, to examine multi-collinearity, we calculated variance inflation factors (VIF) for the regression equation. The VIF for the Model † was 1.62, which is well below the rule-of-thumb cut-off of 10 (Field, 2005).

Table 3. Means, standard deviations and correlations

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) SOPPD	3.89	.76							
(2) SOICD	3.94	.75	.617**						
(3) Organizational performance	3.48	.66	.543**	.561**					
(4) Financial and market performance	3.21	.91	.315**	.361**	.829**				
(5) Quality performance	3.81	.68	.335**	.459**	.708**	.526**			
(6) Innovation performance	3.48	.96	.472**	.510**	.847**	.686**	.504**		
(7) Environmental performance	3.54	.82	.494**	.333**	.709**	.464**	.347**	.493**	
(8) Social performance	3.33	.86	.479**	.494**	.752**	.478**	.481**	.520**	.424**

\*\* Correlation is significant at the 0.01 level (2-tailed).

Table 4. Results of regression analysis: SOPPD, SOICD, and organizational performance

<b>Dependent: organizational performance</b>	
	<b>Model</b>
SOPPD	0.315**
SOICD	0.364**
R <sup>2</sup>	0.375
Adjusted R <sup>2</sup>	0.364
F	33.047
P-value of overall model	0.000

\*\* $P < 0.01$

As shown in Table 4, the results of the regression analysis suggest that both sub-constructs of sustainability-oriented innovation practices have a significant relationship with organizational performance ( $\beta = 0.315$ ,  $p < 0.01$ ;  $\beta = 0.364$ ,  $p < 0.01$  respectively). R square shows that 38% of the variation in organizational performance is explained by the sustainability-oriented innovation practices. Thus, the basic premise which suggests a positive relationship between sustainability practices and organizational performance is supported.

## 5 Discussion and conclusions

Debates relating to corporate sustainability are becoming important subjects of the wide range of management literature in this century (Asif et al., 2011). Organizations are confronted with environmental and social issues in their decisions, not only to take into account moral and legal responsibility that need to be encouraged (Takala and Pallab, 2000), but also to ensure sustainable economic success (Wagner, 2010; Koo et al., 2013). Although researchers have widely discussed the relevant issues of sustainability-oriented innovation (e.g. Wagner, 2008; Klewitz and Hansen, 2013), there is a lack of empirical evidence on the relationship between these activities and overall organizational performance. To fill this existing research gap, this research proposed a novel construct – sustainability-oriented innovation practices - and developed a research framework to further discuss the effect of these practices on the organizational performance.

Furthermore, our study underscores previous assertions that organizations can benefit from pursuing sustainability (e.g. Schaltegger and Wagner, 2006). The results of the regression analysis have confirmed the premise that sustainability practices positively influence the organizational performance. As such, the study provides empirical evidence indicating that organization can benefit by obtaining and deploying sustainability-oriented innovation practices. In particular, the results of this study suggest that organizational learning in terms of developing new sustainability-

oriented innovation competencies can provide superior performance benefits to the organization. Indeed, several prior studies have suggested that organizational learning with regard to innovation can contribute positively to the sustainability (e.g. Lozano, 2011; Siebenhuner and Anold, 2007). In this regard we can argue that developing capabilities and, therefore, acquiring the intangible assets, is essential for future growth and it is needed to successfully integrate and embed the sustainability in every aspect of the organization.

Furthermore, the results of this study indicate that organizations can benefit from integrating sustainability aspects in their products and processes, as reflected by the positive and significant effect of SOPPD on the organizational performance. These findings are somewhat supporting the argument that incorporating sustainability activities in product and process development can provide tools and mechanisms to organizations to enhance their economic benefits without affecting environment and communities (Pujari, 2006; Schrette et al., 2013). Therefore, our study leads us to suggest that organizations should built sustainability aspects into tangible and intangible product/process quality characteristics, through a constant focus on stakeholders' wants and needs, and on the basis of principles of continuous improvement.

### 5.1. Theoretical contributions and managerial implications

While drawing on earlier work on performance implications of sustainability management activities (e.g. Wagner, 2008), this research contributes to the literature by focusing on the link between sustainability-oriented innovation practices and organizational performance (e.g. Antony and Bhattacharyya, 2010). Seen in this context, the main theoretical contribution of this study is reflected through the proposal of a novel construct – sustainability-oriented innovation practices - and the successful verification of the effect of these practices on the organizational performance. Additionally, this study considered “sustainability-oriented process and product deployment” and “sustainability-oriented innovation competencies deployment” as the two sub-dimensions of the newly developed construct. This is significant because so far there are only a few empirically based studies that investigate sustainability-related innovations and its performance implications. In this regard, this work can contribute to a better understanding of the underlying dimensions of sustainability-oriented innovation and its relationship with the overall organizational performance. The developed research framework and empirical evidence from this study can provide useful reference for further studies to investigate the relevant literature regarding corporate sustainability, innovation, and performance.

In addition, our results also have significant managerial implications. First, organization's competitive advantage can be achieved by focusing on its environment, includ-

ing its customers' needs and other stakeholders' demands as well as by interacting with potential partners. Among others, this also requires from organization to change the view of the customer from a passive participant to an active contributor in product development (Witell et al., 2011). Therefore, managers should encourage employees to understand stakeholders' present and future needs as well as to pursue knowledge that is outside the scope of their organization. Considering the intra-organizational creation of new knowledge, managers should take into account cross-functional integration in order to enable employees to share existing knowledge and develop new sustainability-oriented innovation competencies.

Second, the capability of an organization to create innovative and sustainable solutions (i.e. process innovations, product innovations and service innovations) can be viewed as organizational resource. Therefore, managers should establish an efficient mechanism to sustain this asset and effectively use it to enhance performance and gain competitive advantages. Accordingly, managers should strive to achieve sustainable innovation excellence in terms of developing innovative new products or services in a way which both in the short term and in the long run satisfies the customers and other stakeholders, such as employees, suppliers and society, in a balanced way (Dahlgard-Park and Dahlgard, 2010).

## 5.2. Limitations and future studies

As with all empirical studies, there are a number of limitations and directions for future research. First, the scales that were used to measure the construct 'sustainability-oriented innovation practices' capture only limited dimensions of innovation-related themes. Future research needs to examine the usefulness of additional measures. Secondly, due to a relatively small sample size, care should be taken while generalizing the results. Future research on sustainability-oriented innovation could also be more specific in estimating the relative contribution of each of the sub-constructs to the particular dimension of organizational performance (e.g. comparison of the effects of SOPPD and SOICD on the financial and market performance). Therefore, the results of this study can stimulate further development of theory building and conceptual development within the interdisciplinary field of corporate sustainability, quality management, innovation, and performance.

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## Appendix A

### Measurement items – organizational performance

Financial and market performance	Factor loadings
*PERF1. Return on investment (ROI) has increased above industry average during the last 3 years	0.587
PERF2. Sales growth has increased above industry average during the last 3 years	0.833
PERF3. Profit growth rate has increased above industry average during the last 3 years	0.799
PERF4. Market share has increased during the last 3 years	0.750
<i>Quality performance</i>	
*PERF5. The quality of our products and services has been improved during the last 3 years	0.516
PERF6. Customer satisfaction has increased during the last 3 years	0.634
PERF7. Customer complaints has decreased during the last 3 years	0.859
PERF8. The cost of poor quality has decreased during the last 3 years	0.785
<i>Innovation performance</i>	
PERF9. The organization has introduced more innovative products and services than our main competitors during the last 3 years	0.730
PERF10. Our new products and services are perceived by our customers as innovative	0.714
PERF11. The speed of adoption of new technology is faster than at our main competitors	0.690
*PERF 12. The number of innovations that provide the organization with a sustainable competitive advantage has increased during the last 3 years	0.570
<i>Environmental performance</i>	
PERF13. The efficiency of the consumption of raw materials has improved during the last 3 years	0.717
PERF14. The resource consumption (thermal energy, electricity, water) has decreased (e.g. per unit of income, per unit of production, ...) during the last 3 years	0.758
PERF15. The percentage of recycled materials has increased during the last 3 years	0.768
PERF16. The waste ratio (e.g. kg per unit of product, kg per employee per year) has decreased during the last 3 years	0.696
<i>Social performance</i>	
PERF17. The turnover ratio has decreased during the last 3 years	0.706
PERF18. The employees' satisfaction has increased during the last 3 years	0.795
PERF19. The employees' motivation has increased during the last 3 years	0.760
*PERF 20. Health and safety performance has improved during the last 3 years	0.665
*PERF 21. Employee education and training (man-days per employee per year) have increased during the last 3 years	0.539

\*Excluded from further analysis