

The Impact of Using Partnerships to Achieve
Sustainability on Firm Performance – A Series of Event
Studies

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Abstract

To improve overall supply chain sustainability, firms initiate economic, environmental, and social activities. Firms often partner with other organisations to access the knowledge, skills and other resources they need. Using three event studies, this thesis investigates the impact of three kinds of partnership on a firm's financial performance: partnership for IT-enabled innovations in logistics, partnership for initiating circular economy (CE) activities, and partnership for carrying out social initiatives. This thesis comprises three interrelated manuscripts that contribute to the supply chain sustainability literature as described below.

The first study draws on service-dominant (S-D) logic and the resource-based view (RBV) of the firm to conceptualise and explain the relationship between establishing partnerships for developing innovative IT-enabled logistics services and firm market value. This phenomenon was examined using a multi-country event study methodology with a sample of 121 logistics service providers (LSPs), 89 of whom had partners while 32 did not. The analysis revealed that IT-enabled logistics service innovations developed in partnership increase LSPs' market value. This impact is moderated by firm size and growth opportunities. Additionally, collaboration experience did not impact LSPs' financial performance. However, LSPs that developed several IT-enabled logistics services with the same partner experienced an increase in their market value.

The second study uses the natural resource-based view (NRBV) and the relational view of the firm to conceptualise and explain the relationship between the use of partnerships for initiating CE activities and the firm's market value. The NRBV theorises three levels of strategic capabilities that are relevant for achieving environmental sustainability, ranked from low to high level. Then, using a multi-country event study methodology, this study

estimated the effect of 105 CE initiatives on the firm's market value. Of these 105 firms, 68 used partners for their CE initiatives, while 37 did not. The analysis revealed that using a partnership for initiating CE activities increases a firm's market value, with the magnitude being greater than that reported previously for green supply chain initiatives. However, the differences in the coefficients between the three levels of strategic capabilities were not statistically significant. This relationship is found to be moderated by financial slack and growth potential. Interestingly, prior positive environmental performance did not have a similar effect.

Finally, the third study uses signalling theory and resource dependence theory (RDT) to conceptualise and explain the relationship between setting up partnerships for social initiatives and the market value of firms. Using the event study methodology, this research estimated the effect of 765 social initiatives on the market value of firms from the United States. Of these 765 firms, 705 had partners for initiating social activities, while 60 did not. The findings showed that the use of partners to initiate social activities did not affect firms' market value. This relationship was moderated by the firms' visibility and growth potential. The firms that initiated hunger prevention activities derived positive abnormal returns.

While previous studies argued that environmental and social sustainability can be achieved at the expense of economic sustainability, this study suggests that firms can use partnerships strategically to address issues related to the three pillars of sustainability and enhance financial performance from each of these pillars. Theoretically, the studies demonstrate varying levels of support for the different theories used in each study. Study 1, which was based on S-D logic and the RBV, supports the relationship between partnership for IT-enabled logistics innovation and financial performance. The second study, conceptualised on the NRBV and the relational view of the firm, corroborates the

relationship between partnership for initiating CE activities and financial performance. However, the third study did not find support for the relationship between partnerships for social initiatives and financial performance that was conceptualised on signalling theory and the RDT. For managers, the results indicate that partnering with other firms to develop IT-enabled logistics innovations and initiate CE activities is positively viewed by investors. In terms of socially responsible activities, focusing on hunger prevention activities is similarly well-regarded.

Table of contents

Abstract	i
List of figures	xii
List of tables	xiii
Abbreviations	xvi
Attestation of authorship.....	xvii
Acknowledgement.....	xviii
Chapter 1 Introduction.....	1
1.1 Background.....	1
1.1.1 The concept of sustainability	2
1.1.2 Three pillars of sustainability	3
1.1.3 Sustainability in the supply chain.....	5
1.2 Motivation for the study	7
1.2.1 Research gap	8
1.2.2 The interaction of firm-level factors	12
1.3 Thesis outline.....	13
Chapter 2 Conceptualisation.....	11
2.1 Two views on partnership development.....	14
2.2 Antecedents of partnership for sustainability.....	17
2.3 Partner selection	18

2.4	Partnership governance	20
2.5	The impact of partnership on financial performance of the firms.....	21
Chapter 3 Research design.....		24
3.1	Overview of the studies.....	24
3.2	Choice of research paradigm.....	25
3.3	Advantages and disadvantages of event study methodology	29
3.4	Assumptions in the event study methodology.....	31
3.4.1	Efficient market hypothesis	31
3.4.2	Unexpected events.....	33
3.4.3	Confounding events	33
3.5	Calculation of cumulative average abnormal returns (CAARs) or (CARs)	33
3.5.1	Sample characteristics.....	34
3.5.2	Estimation window.....	37
3.5.3	Choice of market index	37
3.5.4	Event window	37
3.5.5	Return models	38
3.5.5.1	Market model	39
3.5.5.2	Constant mean return model	40
3.5.5.3	Fama-French 3-factor model	41
3.6	Statistical significance tests in the event study analysis	43

3.6.1	Time series t-test.....	43
3.6.2	Cross-sectional t-test.....	44
3.6.3	Standardised residual test (Patell test).....	44
3.6.4	Standardised cross-sectional residual test or BMP test	46
3.6.5	Corrado rank test	47
3.6.6	Generalised sign test	48
3.6.7	Wilcoxon rank test	49
3.7	Hierarchical regression analysis	50
3.7.1	Outliers and heteroscedasticity	51
3.7.1.1	Tests for outliers	54
3.7.1.2	Tests for heteroscedasticity.....	56
3.7.1.3	Robust regression	57
Chapter 4	Manuscript 1: Economic sustainability	61
4.1	Introduction.....	62
4.2	Literature review	65
4.3	Theory and hypothesis development.....	67
4.3.1	The relationship between partnership for innovation and S-D logic.....	67
4.3.2	The relationship between competitive advantage and financial performance.....	73
4.3.3	Value co-production with IT.....	75
4.3.4	Firm size of LSPs	78

4.3.5	Growth potential of partnership for innovation.....	78
4.3.6	Type of partners for logistics innovation	79
4.3.7	Partnership experience	81
4.4	Methodology	82
4.4.1	Sample.....	83
4.4.2	Time windows	87
4.5	Variable construction and definitions	87
4.5.1	Computation of abnormal returns.....	87
4.5.2	How IT was used in service development.....	88
4.6	Dependent variables.....	88
4.7	Independent variables.....	89
4.8	Control variables.....	90
4.8.1	Descriptive statistics.....	91
4.9	Hierarchical regression model.....	92
4.10	Results.....	93
4.10.1	Hierarchical regression results.....	95
4.10.2	Model diagnostics	96
4.10.3	Comparison of the effect of type of partners on CARs.....	97
4.10.3.1	Customers and IT-providers.....	97
4.10.3.2	LSPs and customers.....	97
4.10.3.3	LSPs and IT providers.....	98

4.10.4	Comparison of partnership with IT and without IT.....	98
4.11	Discussion.....	98
4.11.1	The effect of firm size.....	99
4.11.2	The effect of growth potential.....	100
4.11.3	The effect of collaborating partners.....	100
4.11.4	The effect of partnership experience.....	101
4.12	Conclusion, limitations and future research.....	103
Appendix 1: Validation of effect size and statistical power for the regression		
	Analysis.....	106
Chapter 5	Manuscript 2: Environmental sustainability.....	108
5.1	Introduction.....	108
5.2	Theoretical background.....	112
5.2.1	The natural resource-based view (NRBV).....	112
5.2.2	The relational view.....	113
5.3	Hypothesis development.....	114
5.3.1	Impact of CE initiatives and the role of partnership.....	114
5.3.2	Impact of CE initiatives.....	114
5.3.3	Impact of different strategic capabilities developed by CE initiatives.....	116
5.3.4	Partnership for CE initiatives.....	118
5.4	Factors influencing the effect of CE partnership.....	119
5.4.1	Prior positive environmental performance.....	119

5.4.2	Growth opportunities	120
5.4.3	Financial slack.....	121
5.5	Methodology and data	122
5.5.1	Sample.....	123
5.5.2	Announcement categorisation.....	128
5.5.3	Calculation of cumulative average abnormal returns	131
5.5.4	Dependent variables	132
5.5.5	Independent variables.....	133
5.5.6	Control variables	134
5.5.7	Descriptive statistics of the variables.....	135
5.6	Results.....	137
5.6.1	Event study analysis results	137
5.6.2	Regression results	140
5.7	Discussion	142
5.7.1	Theoretical implications.....	142
5.7.2	Managerial implications.....	145
5.8	Conclusion	146
	Appendix 1: An analysis of hat-values	149
	Appendix 2: Validation of effect size and statistical power for the regression analysis.	149
Chapter 6	Manuscript 3: Social sustainability.....	151
6.1	Introduction.....	151

6.2	Conceptualisation.....	156
6.2.1	Social sustainability	157
6.2.2	Reporting social activities.....	157
6.2.3	Signalling theory and social sustainability initiatives.....	159
6.2.4	Social initiatives and the use of resources.....	160
6.2.5	Appropriateness of social sustainability activities.....	162
6.2.6	Proactive and reactive social sustainability	162
6.2.7	Growth opportunities.....	163
6.2.8	Financial slack.....	164
6.2.9	Visibility	164
6.3	Methodology	165
6.3.1	Sample.....	166
6.3.2	Estimation window.....	173
6.3.3	Computation of cumulative average abnormal returns	173
6.3.4	Dependent variables	175
6.3.5	Independent variables.....	175
6.3.6	Control variable.....	176
6.3.7	Descriptive statistics of the variables.....	177
6.3.8	Hierarchical regression model	179
6.4	Results.....	183
6.4.1	Regression results	188

6.4.2	Model diagnostics	189
6.5	Discussion	190
6.6	Theoretical and managerial implications	195
6.7	Conclusion and limitations	196
Appendix 1: Validation of effect size and statistical power for the regression analysis.		199
Chapter 7	Overall discussion, contributions, implications, and conclusion	201
7.1	The impact of economic sustainability initiatives and managerial implications	202
7.2	The impact of environmental sustainability initiatives and managerial implications	203
7.3	The impact of social sustainability initiatives and managerial implications	205
7.4	Contributions	205
7.5	Policy implications	210
7.6	Limitations and future research	213
7.7	Conclusion	216
References.....		218

List of figures

Chapter 3

Figure 1: Event window lengths	43
Figure 2: Examples of three types of random outliers.	52
Figure 3: Influential observations	52
Figure 4: Visual test for heteroscedasticity.....	56

Chapter 4

Figure 5: A sample announcement used in this study	70
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Chapter 5

Figure 6: Distribution of sample.....	126
Figure 7: A sample announcement of CE initiative with partnership.....	127
Figure 8: A sample announcement of CE initiative without partnership	128
Figure 9: Categorisation of CE initiatives into three strategic capabilities.....	130
Figure 10: Hat values.....	149

Chapter 6

Figure 11: Partnership based social initiative	172
Figure 12: A social initiative without partnership.....	173

Chapter 7

Figure 13: Integrated framework for studying firm sustainability.....	209
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List of tables

Chapter 1

Table 1: Analysis of prior studies of inter-firm sustainability collaboration.....	9
--	---

Chapter 3

Table 2: Methodological decisions for each study.....	59
---	----

Chapter 4

Table 3: SDL axioms and foundational premises (FPs) and its relationship with LSPs.....	71
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Table 4: Breakdown of announcements collected.....	84
--	----

Table 5: List of keywords used.....	84
-------------------------------------	----

Table 6: Distribution of final announcements.	86
--	----

Table 7: Descriptive statistics of the independent variables.	92
--	----

Table 8: Pearson correlation between dependent, independent and control variables used in the hierarchical regression.	92
--	----

Table 9: Abnormal returns for the Event Day (0) using two different market models. ...	93
--	----

Table 10: Event study results of the analysis for partnership for innovations using multi- country market model.	94
--	----

Table 11: Abnormal returns for the Event Day (0) of IT-enabled innovations using multi- country market model.	94
---	----

Table 12: Event study results of partnership for IT-enabled innovations using multi-country market model.	95
---	----

Table 13: Results of hierarchical regression analysis.....	96
--	----

Chapter 5

Table 14: Announcement search keywords.....	124
---	-----

Table 15: Descriptive statistics of the variables.....	136
Table 16: Pearson correlation between dependent, independent and control variables used in the hierarchical regression.....	137
Table 17: Event study results based on the full sample.....	137
Table 18: Abnormal returns for the three-day event window (-1,+1) using two different market models.	139
Table 19: Event study results of the analysis of announcements of partnership for CE initiatives.....	139
Table 20: Event study results of announcements of CE initiatives without partnership.	140
Table 21: Results of hierarchical regression	141
Chapter 6	
Table 22: Dimensions of social sustainability	167
Table 23: Keywords and search results.....	168
Table 24: Number of announcements	171
Table 25: Grouping of announcements	179
Table 26: Descriptive statistics of independent variables.	181
Table 27: Correlations between independent and dependent variables used in the regression	182
Table 28: Event study results using multi-country and 3-factor market model for the full sample.....	185
Table 29: Event study results using market model for the full sample	185
Table 30: Event study results using market model and 3-factor market model for subsample (Without partnership)	186

Table 31: Event study results using market model for subsample (Without partnership).....	186
Table 32: Event study results using market model and 3-factor market model for subsample (With partnership).....	187
Table 33: Event study results using market model subsample (With partnership).....	187
Table 34: Results of hierarchical regression analysis (n= 578). The dependent variable is the CARs over three days (-1, +1), calculated using the market model.	189
Chapter 7	
Table 35: Abnormal returns obtained from the three studies.	207

Abbreviations

AARs	Average Abnormal Returns
ARs	Abnormal Returns
BMP Test	Boehmer, Musumeci, and Poulsen Test
CARs	Cumulative Abnormal Returns
CE	Circular Economy
DJSI	Dow Jones Sustainability Index
GRI	Global Reporting Initiatives
IT-enabled	Information Technology Enabled
KLD	Kinder, Lydenberg, Domini Research & Analytics
LSP	Logistics Service Providers
MM	Market Model
NGOs	Non-Government Organisations
NRBV	Natural Resource Based View
OLS Regression Model	Ordinary Least Squares Regression Model
RBV	Resource Based View
RDT	Resource Dependence Theory
S-D Logic	Service Dominant Logic

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

I further declare that I am the principal author of the following jointly authored three manuscripts of this thesis. I have been engaged in the initial idea generation, theory selection, hypotheses development, variables selection, data collection, analyses, and writing the draft of the manuscripts. All three supervisors are my co-authors. They assisted me with refining the ideas, aligning the phenomena/concepts with theories, critically evaluate the analysis and results, editing and commenting on the drafts. The first manuscript is under review with *Decision Sciences*. The second manuscript is under review with *Management Science* and the third manuscripts will be submitted to the *Journal of Business Ethics* on 10/03/2020. The following table summarises the agreed percentage contribution for each manuscript.

Contribution percent	Hari Shanker Srivastava	Dr Harminder Singh	Dr Lincoln C. Wood	Dr Abraham Zhang
Manuscript 1	80%	5%	10%	5%
Manuscript 2	80%	5%	5%	10%
Manuscript 3	80%	10%	5%	5%

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Chapter 1 Introduction

1.1 Background

“John Lewis, a retailer, formed a partnership with Clipper Logistics, a logistics service provider, to offer next day delivery of their online orders using John Lewis’s green van fleet (Clipper Logistics, 2015).”

“Dell formed a partnership with Wistron for a sustainable e-waste recycling solution based on the closed-loop recycled products. Wistron has developed an innovative electronics recycling technology to minimize waste and maximize post-consumer use of plastics for manufacturing computers (Wistron Corporation, 2014).”

“Guidance Software Inc., the world leader in digital investigations, formed a partnership with Digital Intelligence and the National Association to Protect Children, known as PROTECT, to understand their needs and donate forensic software resources and training to reveal the exploitation of children and rescue them if they are at risk (BusinessWires, 2013).”

All of the above examples show a major shift in the way businesses are conducted. In recent times, firms have been increasingly leveraging inter-firm resources to address business issues through structural changes such as the formation of partnerships in their supply chains. This is in contrast to past business practices, which prioritised the development of unique resources internally (Barney, 1991; Jänicke, Mönch, Ranneberg, & Simonis, 1989). The structural changes can be attributed to the need to reconfigure or recombine both tangible (i.e. physical) and intangible (i.e. knowledge) resources that exist within and beyond firms’ boundaries to address major business issues related to improving economic, environmental, and social performance. Firms have been introducing structural

changes into their supply chains due to reduced profits (Hsueh, 2015), shrinking resources of natural raw materials, environmental damage caused by their business operations (Witjes & Lozano, 2016), pressure from the regulatory bodies and consumers, and expectations of societies (Morais & Silvestre, 2018).

Prior studies reported that innovation improves profit (Cooper, 2011), using waste as raw material reduces environmental impact (Ellen MacArthur Foundation, 2017), and addressing social issues improves reputation and legitimacy (Zheng, Luo, & Maksimov, 2015). Firms with resources and capabilities to innovate, use waste as raw material, and address major social issues can have a competitive advantage (Barney, 1991). The availability or access to resources and capabilities to focus on economic, environmental and social issues may ensure a firm's long-term survival, which may have a significant impact on its revenue compared to those firms that have no such resources.

The supply chain approach to generating long-term value by understanding how a firm can operate and grow in the economic, environmental, and social settings is known as sustainable business development (Seuring & Müller, 2008b). In a quest for long-term survival, firms have begun to realise that their supply chains need to include a sustainability strategy.

1.1.1 The concept of sustainability

In the book 'Sylvicultura Oeconomica', Hans Carl von Carlowitz used the term "sustainability" for the first time in 1713 to underline the importance of planting trees to meet the timber demand without decimating natural resources. The 1960s saw the emergence of environmental campaigns aimed at addressing increasing problems of inadequate resource utilisation and ineffective waste management (Kopnina & Blewitt, 2018). The term 'sustainability' became common after 1987 when the United Nation's World

Commission on Environment and Development used this to describe sustainable development to “meet the needs of the present generation without compromising the ability of future generations to meet their own needs” (Keeble, 1987). This can be achieved by setting the goals of using and developing resources to meet the present and future needs (Cocklin, 1989).

Thus, sustainability is a state that ensures the present and future availability of resources through the determined use of existing tangible and intangible resources. It highlights the importance of human abilities to maintain resources over time. This concept means not losing what is found, but retaining the driving forces that allow socio-economic systems, environment, and humans to develop continuously (McKenna & Biloslavo, 2011). The driving forces can be resources and capabilities to innovate, use waste as raw material, and address critical social issues.

1.1.2 Three pillars of sustainability

Sustainability is usually implemented through the three pillars of sustainability, which emphasise improving the economic, environmental and social performance of business processes (Purvis, Mao, & Robinson, 2019). Economic sustainability relates to reducing costs or maintaining a “positive difference” between total revenues and total expenses and taxes, known as net profit, over a long period. Products that are designed, produced, transported, distributed, returned, and disposed of in such a way as to have low costs and high revenues are expected to improve economic sustainability.

Environmental sustainability is often linked to reducing waste, decreasing air, water, and land pollution, improving energy efficiency, lowering emission levels, and decreasing hazardous, dangerous or toxic material use in design and production (Gimenez, Sierra, & Rodon, 2012).

Social sustainability is defined as the achievement of human flourishing or thriving that includes a sense of uniqueness, dignity, freedom, happiness, and overall well-being within society (McGhee & Grant, 2016). Firms support individuals within (employees) and beyond firms' boundaries (society), to flourish by assuring all human rights to enable them to satisfy their needs and desires now and in the future. In other words, social sustainability requires firms to expand their focus and include not only employees but suppliers, customers, distributors, consumers, local, and International communities and their social needs in their sustainability goals.

While the economic pillar of sustainability is most important (Laosirihongthong, Samaranayake, Nagalingam, & Adebajo, 2019), addressing environmental and social priorities enhances firms' reputation and legitimacy that impact their long-term survival (Longoni & Cagliano, 2015). However, firms struggle to deploy environmental and social strategies (Longoni & Cagliano, 2015) because they often believe that including environmental and social issues in their business practices increases the cost that may impact economic benefits (Porter & Kramer, 2011). Firms can enhance the performance of all three sustainability pillars by implementing key inter-organisational business practices in a strategic, aligned, and systematic manner that enhances not only individual economic performance but also their supply chain performance to achieve overall environmental and social goals (Carter & Rogers, 2008). An understanding of the effect of business practices on the environment helps firms improve those practices and contribute to savings, and adds an additional economic benefit, derived from complying with environmental regulations and risk mitigation (Hart, 1995). Similarly, developing strategies to address social issues in the supply chain increases social reputation that contributes to the acceptance of firms' products and services, thereby influencing economic benefits (Wilson, 2015). It means that

firms may derive financial benefits not only from carrying out economic activities but also from addressing environmental and social issues.

1.1.3 Sustainability in the supply chain

The supply chain concept focuses on efficiency, cooperation, and information sharing to improve overall profitability, without emphasising environmental and social sustainability aspects (Ellram & Cooper, 2014; Christopher, 1999; Handfield & Nichols, 1999). So the notion of the supply chain required changes to include the environmental and social issues essential to the philosophy of the three pillars of sustainability, in order to develop a concept of the sustainable supply chain.

Seuring and Müller (2008b) define a sustainable supply chain as “the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e. economic, environmental and social, into account which are derived from customer and stakeholder requirements” (p. 1700). This definition integrates firms’ economic, environmental, and social goals and accentuates the importance of partnership to achieve sustainability in the supply chain. Since products and services represent value addition of all supply chain partners, it is not feasible for a firm to attain sustainability if all supply chain partners do not share information and resources. In addition, risk and uncertainty are involved in sustainable practices and development (Carter & Rogers, 2008). Hence, supply chain partnerships are essential to strategic decision-making to initiate economic, environmental, and social sustainability practices and to reduce risks and uncertainties. Partnership, not just with suppliers and customers, but also with the logistics service providers, non-government organisations (NGOs), regulatory bodies, and research institutions, provides support to achieve the sustainability goals.

As sustainability involves establishing and maintaining interdependent ties between supply chain partners, firms promote sustainable development through incorporating strategic changes by setting up partnerships; so several past studies looked at how developing relationships with suppliers and/or customers as a key supply chain partners affects sustainability performance (Blome, Paulraj, & Schuetz, 2014; Chan, Yee, Dai, & Lim, 2016; Vachon & Klassen, 2008). In addition to suppliers and customers, firms need to develop collaborative relationships with LSPs, NGOs, regulatory bodies, and research institutions. LSPs play a more critical role in supply chain orchestration and sustainability management by enabling solutions for more efficient supply chains to be established (Colicchia, Marchet, Melacini, & Perotti, 2013). NGOs primarily create value in three different ways (Johnson, Dooley, Hyatt, & Hutson, 2018). Firstly, they connect supply chain members; for example, a retailer and farmers. Secondly, they have a significant global outreach, which helps firms understand cultural differences among societies. Thirdly, NGOs have access to different knowledge disciplines, allowing them to exchange inter-disciplinary knowledge and practices with firms to help them develop socially-oriented supply chains (Johnson, Dooley, Hyatt, & Hutson, 2018). Regulatory bodies and research institutions help firms to improve public acceptance of products or processes, reduce losses and waste, and enhance profitability (Arias Bustos & Moors, 2018; Vanhaverbeke & Cloudt, 2006).

Hence, the role of LSPs, NGOs, regulatory bodies, and research institutions in improving economic and social performance cannot be ignored. Prior studies seem to overlook the role of partnership with LSPs for economic sustainability, and with NGOs, regulatory bodies, and research institutions for initiating social activities, and their effect on focal firms' financial performance. The definition of CE is based on the use of waste as raw material, which impacts firm environmental performance by reducing the reliance on natural raw materials,

but its effect on the firms' financial performance is unknown. Additionally, the role of focal firms' partnerships with other firms to initiate circular economy (CE) practices and their impact on financial performance is another unexplored area. The definition of CE is based on the use of waste as raw material, which impacts the environmental performance by reducing the reliance on natural raw materials, but its effect on the firms' financial performance is unknown.

1.2 Motivation for the study

There are three motivations for the study. Firstly, firms that want to become sustainable need knowledge, skills and resources that are different from what they possess for their existing operations. Thus, they rely on external parties to help them achieve their environmental and social goals without sacrificing economic objectives. This organisational practice has not been well studied in the literature, and the present study seeks to provide a theoretical framework to explain the logic behind the practice. Secondly, the returns from sustainability initiatives carried out in partnership are uncertain and difficult to quantify, especially in terms of whether they enhance a firm's financial performance. The uncertainty arises from the difference in the contexts and the use of perceptual measures. This ambiguity of outcomes may deter firms from carrying out sustainability-related initiatives in partnership. Finally, it is possible that the uncertain outcomes of sustainability-related initiatives may be due to firm-level differences. This study will examine the extent to which firm-level differences influence the financial performance of sustainability initiatives, so as to support managerial decision making.

Section 1.2.1 discusses the first two motivating factors and Section 1.2.2 discusses the last factor.

1.2.1 Research gap

A key issue in the literature on sustainability is recognition of the costs associated with inadequate sustainability performance. Inadequate sustainability performance often results in reduced financial performance (Rogers, 2011). Therefore, supply chain practitioners often trade off the discrepant outcomes of different types of sustainability activities to balance out the overall performance of their supply chains (Seuring & Müller, 2008). In some cases, due to resource or supervisory constraints, firms switch between different types of sustainability activities in their supply chains for their long-term survival. However, our ability to compare and draw conclusions from the consequences of such initiatives is hampered by our limited knowledge of how sustainability initiatives are carried out in different contexts: context matters in the interpretation and implementation of sustainability initiatives (Bag, Wood, Xu, Dhamija, & Kayikci, 2020), especially when research has found discrepant outcomes.

One way to overcome the challenges of implementing sustainability initiatives is to use partnerships (Blome, Paulraj, & Schuetz, 2014). Developing partnerships is a complex process with a very high failure rate (Fawcett et al., 2012). While the establishment of partnerships for sustainability initiatives is closely linked to a firm's financial performance (Callan & Thomas, 2009; Zhu & Sarkis, 2004; Ashby, Leat, & Hudson-Smith, 2012; Gold, Seuring, & Beske, 2010; Gunasekaran, Subramanian, & Rahman, 2015), more than half of such partnerships fail (Park & Ungson, 2001). Firms invest resources such as money, skills, and time to develop partnerships, and those resources are lost when partnerships fail.

Table 1 summarizes previous studies on inter-firm partnership for sustainability initiatives. In terms of the phenomenon, the majority of studies in this topic examined environmental sustainability projects, while a smaller number also studied economic and

social sustainability projects. Methodologically, most studies on this topic have used surveys (i.e. perceptual measures), case studies, and literature reviews. Only a few studies have used more objective measures, such as publicly-available financial metrics (i.e. Wang & Sarkis, 2013). The results from the studies listed in Table 1 are inconclusive: some studies reported positive outcomes (i.e. Dangelico & Pontrandolfo, 2015), while others found negative (i.e. Zhu, Sarkis, & Geng, 2005) or no effects (i.e. Lai & Wong, 2012). Thus, there is a need to examine these varying outcomes and explore why they differ. In terms of the theories that have been used to study this topic, one of the most commonly used is the resource-based view of the firm (RBV) (Barney, 1991). The RBV argues that partnering is a valuable capability where inter-firm resources are used by firms to exploit external opportunities to improve market share and profitability. Different inter-firm resources and capabilities may affect the economic gains generated from sustainability initiatives. Other theories that have been used to study sustainability partnerships include the natural resource-based view (Hart, 1995) and the relational view of the firm (Dyer & Singh, 1998). It is worth noting that a significant number of studies in Table 1 (13 out of 27) did not use any theory at all.

Table 1: Analysis of prior studies of inter-firm sustainability collaboration

Author(s)	Supply Chain Focus/Industry	Theory used	Sustainability initiatives	Research Method	Performance measure(s)	Impact on performance
Zhu et al., 2005	Green/Multiple industries	No theory	Economic, Environmental	Survey	Perceptual	Positive environment and negative economic
Vochon, 2007	Green/Package printing	No theory	Economic, Environmental	Survey	Perceptual	Mixed-partnership with customers negative economic
Lee & Klassen, 2008	Green/Manufacturing	No theory	Economic	Case study	Perceptual	Positive economic
Gold et al., 2010	Sustainable Supply Chain/	Resource Based Theory	Economic, Environmental	Content analysis	Perceptual	Positive economic and environmental

	Multiple industries						
Zhu, Geng, & Lai, 2010	Circular Economy/ Manufacturing	Ecological Modernisation Theory	Economic, Environmental	Survey	Perceptual	Positive economic and environmental	
Gimenez, Sierra, & Rodon, 2012	Sustainable Operations/ Manufacturing	Natural Resource Based Theory	Economic, Environmental, Social	Survey	Perceptual	Positive economic, environmental, and social	
Barari, Zhang, Mahanty, & Tiwari, 2012	Green/Garment	No theory	Economic, Environmental	Mathematical model	Direct	Positive economic and environmental	
Kim & Rhee, 2012	Green/Multiple industries	No theory	Economic	Survey	Perceptual	Negative and insignificant economic	
de Giovanni & Esposito Vinzi, 2012	Green/ Multiple industries	No theory	Economic, Environmental	Survey	Perceptual	Positive environmental /No effect on economic	
Green, Zelbst, Bhadauria, & Meacham, 2012	Green/Manufacturing	No theory	Environmental	Survey	Perceptual	Positive environmental	
Albino, Dangelico, & Pontrandolfo, 2012	Inter-organisation/ Multiple industries	Resource Based Theory	Environmental	Survey	Perceptual	Positive environmental	
Lai & Wong, 2012	Logistics	No Theory	Economic, Environmental	Survey	Perceptual	No effect on economic	
Golicic & Smith, 2013	Supply Chain/ Multiple industries	No theory	Economic	Meta-analysis	Perceptual	Mixed (60% positive, 40% negative)	
Wang & Sarkis, 2013	Supply Chain/ Multiple industries	No theory	Economic, Environmental, Social	Survey	Direct	No effect on economic	
Chen & Hung, 2014	New Product Development/ Multiple industries	Social capital	Economic, Environmental	Survey	Perceptual	Positive environmental and economic	
Paulraj, Jayaraman, & Blome, 2014	Structural Governance/ Multiple industries	Relational Exchange Theory	Environmental, Social	Survey	Perceptual	Positive environmental and social	
Schoenherr, Modi, Talluri, & Hult, 2014	Strategic Sourcing/ Manufacturing	Resource Based Theory	Environmental	Survey	Perceptual	Positive environmental	
Choi & Hwang, 2015	Green/Manufacturing	Natural Resource based view,	Economic, Environmental	Survey	Perceptual	Mixed (Negative economic performance)	

		Relational View				
Dangelico & Pontrandolfo, 2015	Green/ Multiple industries	Resource Based Theory	Economic	Survey	Perceptual	Positive economic
Luzzini, Brandon-Jones, Brandon-Jones, & Spina, 2015	Purchasing/ Multiple industries	Resource Based Theory	Economic, Environmental, Social	Survey	Perceptual	Positive economic, environmental, social
Chen et al., 2015	Supply Chain/Electrical and Electronic	Natural Resource Based Theory, Stakeholders' View, Top Management Support View	Economic, Environmental	Survey	Perceptual	Positive economic and environmental
Yunus & Michalisin, 2016	Supply Chain/ Not reported	Natural Resource Based Theory	Economic, Environmental	Literature review	Conceptual	Positive economic, environmental
Laari, Töyli, & Ojala, 2017	Green/Manufacturing, Logistics and trading	Transaction Cost Economics, Resource Dependence Theory	Economic, Environmental	Survey	Perceptual	Positive economic, environmental
Feng et al., 2018	Green/Manufacturing	No theory	Economic, environmental	Survey	Perceptual	Positive economic and environmental
Wong, Wong, & Boon-itt, 2018	Supply Chain/ Manufacturing	Resource Orchestration Theory	Economic, Environmental	Survey	Perceptual	Positive economic and environmental
Chen et al., 2019	Supply Chain/ Manufacturing	No theory	Economic, environmental, Social	Mathematical modelling	Direct	Positive economic, environmental, social
Agyabeng-Mensah et al., 2020	Green/ Manufacturing	No theory	Economic, Environmental	Survey	Perceptual	Positive economic

The analysis of the studies in Table 1 revealed that while some attention had been paid to the role of resources and inter-organisational relationships, little work had been carried out on a key aspect of partnerships: the co-creation of value. Similarly, there was no attempt to examine how firms used such sustainability initiatives as signals to the wider investor

community, which is surprising given the high level of public attention paid to environmental and social issues. Finally, the natural-resource-based view (NRBV) of the firm (Hart, 1995, 2011) was only used by a minority of studies on the role of partnerships for environmental sustainability, which is remarkable given the NRBV's appropriateness for such research.

To fill these research gaps, this thesis will use different theories to explain the relationship between the use of partnerships for the three types of sustainability initiatives and firm financial performance in three different supply chain contexts. The overarching research question is: *What is the impact of partnerships for economic, environmental, and social sustainability affect the financial performance of firms, and what factors influence it?*

The above-mentioned research question will be answered by conducting three independent studies that will explore the impact of economic, environmental, and social initiatives on financial performance, respectively. Each study will also investigate the moderating effect of firm-level factors on financial performance.

1.2.2 The interaction of firm-level factors

Firm financial performance is influenced by firm-level factors, such as firm size, growth potential, and financial slack. Prior studies have reported that the impact of firm-level factors differs across countries (Christopher & Filipovic, 2008; Clarkson, Li, Richardson, & Vasvari, 2008; Taylor & Shan, 2007). Christopher and Filipovic (2008) found a strong relationship between firm size and sustainability engagement in Western countries, and marginal significance for Chinese companies. This supports the contention that firm-level factors help explain the relationship between sustainability practices and firm financial performance (Banerjee, Gupta, & Mclver, 2019). This thesis identifies appropriate firm-level factors for the three types of sustainability initiatives and provides a theoretical rationale for their influence on the financial performance of firms. Understanding the role of these factors may

help managers become aware of the financial impact of the sustainability initiatives they engage in.

The main research question is divided into three sub-questions:

- 1) *What is the impact of partnership for IT-enabled logistics innovations on the financial performance of firms, and what factors influence it?*
- 2) *What is the impact of partnership for circular economy (CE) initiatives on the financial performance of firms, and what factors influence it?*
- 3) *What is the impact of partnership for social initiatives on the financial performance of firms, and what factors influence it?*

1.3 Thesis outline

This thesis is structured in seven chapters. Chapter 1 provides the overall research context and the motivation behind the study. Partnership, its antecedents, governance, and its impact on financial performance are outlined in Chapter 2. Chapter 3 provides the research paradigm and the methodological underpinning and decisions for the three empirical studies of economic, environmental, and social partnerships. Chapters 4, 5, and 6 are the separate essays that each start with an introduction, a literature review/conceptualisation that provides a theoretical rationale for setting up partnership, develops hypotheses, explains dependent, independent, and control variables, and performs analysis, presents results, discussion, implications, and the direction for future research. Finally, Chapter 7 presents a discussion and conclusion on how the findings of Chapters 4, 5 and 6 allude to the overall research question posed in Section 1.2.1 This chapter also discusses the theoretical implications and limitations.

Chapter 2 Conceptualisation

2.1 Two views on partnership development

Partnership is a widely-used and broadly-specified concept describing different types of joint activities in the supply chain. Ellram and Cooper (1990) use the definition of partnership as a relationship between the two firms entailing sharing risks and rewards over an agreed time period. Varadarajan and Cunningham (1995) define partnership as the pooling of specific resources and skills by co-operating organisations in order to achieve common goals, as well as goals specific to the individual partners. Partnership may take several forms such as collaboration, strategic alliance, merger, acquisition or joint venture and these terms are used interchangeably in the literature (Hughes, Williams, & Ren, 2012).

Cao et al. (2011) define partnership as collaboration where two or more independent firms work closely to plan and execute supply chain operations toward common goals and mutual benefits. The strategic alliance is regarded by Gulati (1995) as the inter-firm partnership to exchange, share or co-develop innovative products, services or technologies for mutual benefit. A merger or acquisition is another form of partnership to acquire resources, particularly beneficial when all resources such as tacit knowledge and physical infrastructure are valuable and can provide operational and financial synergies (Damodaran, 2012). For example, merger or acquisition of an asset-light logistics company by an asset-heavy logistics service provider can be beneficial to gain access in a new market and offer several new logistics services to its customers. Finally, joint venture is a form of partnership between independent firms in which they combine their tangible and intangible resources to establish a new legal entity to perform successful business operations (Morledge & Adnan, 2005).

On the one hand, partnership can be viewed as a process of developing social capital, defined as the “sum of resources that accrue to a firm by virtue of possessing a durable network of inter-firm relationships” (Bourdieu & Wacquant, 1992, p. 119). Social capital includes structural and relational dimensions (Coleman, 1988; Lee, 2015). Structural social capital is about the pattern of ties between partners such as frequency of meeting with a particular person or group of people (Nahapiet & Ghoshal, 1998). Relational social capital refers to the obligation, following norms, trust, respect and reciprocity (Putnam, 2000). Relational capital is nurtured with repeated open and transparent communications with an objective of developing a long-term relationship with partners (Lee, 2015). The level of information richness and volume ensure the likelihood of a successful relationship resulting in improved environmental and operational performance (Koka & Prescott, 2002; Lee, 2015). However, supply chain partners, first, need to identify partners and create a social network structure with mutual acquaintances, recognition, and connections for enhanced communication that time- and path-dependent, requires time to develop such environment. Because the frequency of interaction between different partners at the different level of the supply chains facilitates information transfer that partners can use for improving the supply chain performance. Social capital, with its elements of trust, reciprocity, collective engagement, and level of communications is perceptual that is difficult to measure its impact on financial performance using direct measures such as market share, sales growth, or profits.

On the other hand, partnership is the development of a purposive strategic relationship between independent firms that have common goals and accept a high level of mutual interdependency to gain synergistic advantages (Cao & Zhang, 2011). While acknowledging that implementing sustainability initiatives in the supply chains pose challenges to maintain a flow of information, resources and design a network of interdependent relationships,

sharing of knowledge, skills, and other resources ensure all partners achieve their sustainability objectives without losing economic benefits (Paulraj, 2004). According to strategic management practice, Soylu et al. (2006) emphasise that partnership represents a broad approach for firms to share information and resources to make rational decisions to help them lower overall costs and inventories and enhance performance by reducing ambiguity, complexity, risks and uncertainties (Mehdikhani & Valmohammadi, 2019).

This study adopts the strategic perspective of identifying and forming successful partnerships for implementing sustainability practices to increase the competitive advantage of partner firms leading to improved financial performance. (Cao & Zhang, 2011; Soylu et al., 2006). Therefore, for the purpose of this study, Varadarajan and Cunningham's (1995) definition is extended to define partnership as the strategic process of sharing partnering organisations' knowledge, skills, expertise, and physical resources to achieve common objectives as well as goals specific to individual partners using strategic alliances, collaborations, mergers and acquisitions, or joint ventures as governance mechanisms. The definition emphasises the importance of successfully leveraging complementary resources to pursue strategic goals by using different governance mechanisms such as contract or equity, and will be discussed in more detail in Section 2.3.

Nowadays, there have been increasing external (i.e. stakeholder pressure) and internal concerns (i.e. avoiding penalty) for firms to address environmental and social issues responsibly while retaining their obligation of improving financial performance (Chen et al., 2017). In the same line, this study focused on the effect of partnership for IT-enabled logistics innovation, CE practices, and addressing critical social issues announcements on *anticipated* financial performance. This refers to the change in the market value of firms in

reaction to partnership announcements, irrespective of partnership governance mechanisms.

Firms usually communicate their objectives of sharing knowledge, expertise, skills, and physical resources to the wider public, allowing them to evaluate how partnerships for sustainability would affect the future profitability of the firms and respond by buying or selling the stocks. Partnership for IT-enabled innovation, CE practices, and addressing critical social issues are expected to improve economic, environmental, and social performance respectively.

2.2 Antecedents of partnership for sustainability

The main factors of setting up sustainability partnerships are access to resources (Dyer & Singh, 1998; Melander, 2017), organisational learning (Argote & Miron-Spektor, 2011), and the financial consequences of not achieving adequate sustainability performance while working alone (Melander, 2017). Firms cannot develop or acquire all the resources (Ariño & de la Torre, 1998) to address the issues of the three pillars of sustainability. Firms also understand that poor sustainability performance, whether economic, environmental, or social, can contribute to major incidents which can ruin the business and its relationship with the supply chain partners (Rogers, 2011). So firms turn to forming partnerships to gain access to inter-firm resources to exchange, share and co-produce products, services, or capabilities. For example, an IT-firm with a broad knowledge and experience of developing logistics solutions but without the understanding of the logistics market is more likely to enter into a partnership with an LSP that lacks or cannot develop technological know-how internally but has knowledge of the logistics market. The complementarity of resources between the two firms would allow them to develop new logistics services which may enable the LSP to enter

a new market or to develop a specific resource or capability that neither firm cannot grow by itself (Dyer & Singh, 1998).

Another factor of setting up a partnership concerns the knowledge transfer while developing products, services, or processes jointly (Argote & Miron-Spektor, 2011). Partnership helps firms learn and develop their knowledge resources by integrating them with the partner's expertise (Inkpen, 2008). During the knowledge sharing process, firms may identify the novel use of non-shared, unintended resources to address some critical sustainability issues to achieve competitive advantage (Hamel, 1991; Lavie, 2006; Lavie & Rosenkopf, 2006).

Finally, firms that are not economically sustainable may not be able to carry out their operations for long (Wassenhove, 2019). Poor environmental and social sustainability performance may tarnish public image and reputation or make them liable for huge penalties (Rogers, 2011); firms set up partnerships to avoid such costs.

2.3 Partner selection

This study used partnership announcements to address the three pillars of sustainability. These announcements are the result of due diligence of partners that begins with identifying an appropriate partner and setting up a governance structure to make it functional (Schreiner, Kale, & Corsten, 2009). Partnership formation for a firm is a strategic decision to achieve an organisational goal through the use of inter-firm resources (Kale & Singh, 2007). For this purpose, firms identify and select partners based on various characteristics such as complementarity of resources (Harrison, Hitt, Hoskisson, & Ireland, 2001), financial and environmental benefits (Dyer & Chu, 2011; Yeh, & Chuang, 2011), commitment (Anand & Khanna, 2000), trust (Fawcett, Fawcett, Watson, & Magnan, 2012), and confidence (Brinkerhoff, 2002). An inappropriate match between partners' characteristics can

jeopardise the objective of forming partnership to achieve sustainability (Harrison et al., 2001).

Resource complementarity between partners can facilitate the partner selection process as these resources are partnership-specific; it induces a high level of commitment and trust and limits opportunistic behaviour. In support, Eisenhardt and Schoonhoven (1996) argue that firms' decision to set up a partnership represents the degree to which either one partner meets the resource requirements or the other partner needs critical resources. Additionally, resource complementarity between partners speeds up negotiation of the contracts and conditions, as both organisations are assured of the likelihood of success resulting in increased financial benefits.

A comprehensive assessment of the partner's characteristics is critical for the success of partnership that usually depends on the complexity of the project. Shah and Swaminathan (2008) used management and control strategies to assess the relative importance of characteristics for partnership success. Partnership characteristics, especially those that are difficult or complex to assess, may require a more comprehensive assessment to increase the likelihood of project success. For example, confidence between partners for innovative IT-enabled service development is difficult to establish because its outcome is uncertain and unpredictable. Trust, in this case, plays a critical role in establishing confidence; trust is developed if a firm builds a relationship with the same organisation through working on several different projects. Additionally, due to the risk of opportunistic behaviour, firms are less likely to set up a partnership with a firm with which they have not previously been involved. Thus, the selection of partners basically depends on a trade-off between the partnership objectives assessed against the risk of opportunism.

2.4 Partnership governance

Makadok and Coff, 2009 identified three main factors to differentiate markets and hierarchies: authority, ownership, and incentives. In a traditional market structure, a party doing the work has authority to determine activities and develop processes, owns the critical resources, and takes the responsibility of output, thus bears the risk of losing in the event of poor performance or reward of making a profit in the event of good performance. In contrast, in a traditional hierarchy setting, a party that is often an employee or organisational subunit performs under the authority of a person or an organisation. The superior person or organisation decides the activities, owns the resources and compensates a person or an organisation based on time, skills, or experience. Thus, a person or an organisation working in a traditional hierarchy setting does not bear the risk of poor performance or the reward for good performance.

Generally, partnerships are viewed as hybrid organisational structures because they incorporate both hierarchical, and market aspects (Williamson, 1991) as authority, ownership of resources, and incentives are shared among partners. Hence a governance mechanism has to be implemented to reduce the risk of opportunism and improve the effectiveness of partnership (Kale & Singh, 2009). A governance mechanism is mainly required for enhancing information sharing and trust among partners and improve control of joint processes (Jen, Hu, Zheng, & Xiao, 2020; de Man, 2013).

Equity-based mechanisms, for example, joint ventures, allow firms to learn from one another and reduce the risk of opportunism, as equity binds the firms together (Hennart, 1988). Das and Teng (2000) showed that a firm would probably set up a joint venture with a partner having intangible resources (e.g. knowledge) when the focal firm possesses tangible resources (e.g. property), allowing the focal firm to access the partner's intangible resources

while reducing the likelihood of opportunism (Das & Teng, 2000b). However, the downside is that the cost of forming a joint venture can be high, so it may not be suitable for firms that consider both the financial and organisational elements to access inter-firm resources (de Man, 2013).

Unlike equity-based partnerships, non-equity-based partnerships provide firms with flexibility to quickly form and terminate relationships (Das & Teng, 2000b). These partnerships can be established as bilateral or unilateral contacts (Mowery et al., 1996). Bilateral contracts, for example, joint innovation processes, combining complementary knowledge and skills for production, or joint procurement practices, require firms to invest resources and to operate consistently together (Das & Teng, 2000b). Unilateral contracts, for example, licensing agreements, refer to well-specified property rights transfer. These contracts vary from bilateral ones in a way that firms can perform their roles independently without much collaboration with their partners (Das & Teng, 2000; Das & Teng, 2000b). Moreover, these contracts include a clear specification of licensing resources, and would be preferable for partners intended to share property-based resources such as patents or copyrights (Das & Teng, 2000b).

2.5 The impact of partnership on financial performance of the firms

The growth in partnership discourse and practice in the supply chain literature assumes that partnerships not only maximise performance but also result in synergistic benefits, in which the effects of the relationship in its entirety are greater than the effect partners would have achieved individually. Prior studies support the contribution of partnerships to improve financial performance (Liu & Lai, 2016; Sodhi & Son, 2009; Wang & Sarkis, 2013). In this respect, a firm's long-term survival can be predicted based on the effective resource use

leading to enhanced financial performance. Access to financial resources ensures the procurement of additional resources to achieve environmental and social goals.

In practice, sustainability partnerships in the supply chain may include strategies or plans to innovate IT-enabled logistics services to improve economic sustainability. These include increasing energy cost savings by reducing the use of natural raw materials and different types of wastes, and adopting clean technologies to enhance environmental sustainability. Similarly, strategies to reduce hunger or train local youths to reduce unemployment increase social sustainability. A more significant shift towards a deeper level of partnership with external supply chain partners, including LSPs, competitors, NGOs, regulatory bodies, and research organisations, to re-examine services, production, and social systems may demonstrate firms' efforts to balance the sustainability performance (Seuring & Müller, 2008b).

Sustainability partnerships can have a significant influence on firms, influencing investor perceptions of the sustainability efforts of firms that lead to additional sources of revenue generation affecting their financial performance. While it is difficult to measure the effect of partnership on financial performance, the change in the market value of firms offers a reasonable indicator as a *perceptual* financial performance.

The financial performance of sustainability partnerships can be examined as *perceptual* or actual (Ketokivi & Schroeder, 2004). *Perceptual* financial performance relates to the investors' belief that firms may derive financial benefits during the partnership before the implementation of the partnership. In contrast, *actual* financial performance refers to the performance after the partnership is functional (Ketokivi & Schroeder, 2004) depending on how firms use joint resources and meet the objectives of partnership, for example, whether IT-enabled logistics service innovations are actually helping firms realise financial benefits.

This research focused on *perceptual* financial performance: estimated abnormal returns that show a change in the market value of firms. This provides an advantage over *actual* financial performance, as it is easier to extract directly how a partnership initiative affects financial performance; it is also consistent with the approach adopted by previous studies that examined the effect of partnership on financial performance (Gulati, Lavie, & Singh, 2009; Anand & Khanna, 2000; Koh & Venkatraman, 1991). An event study method is employed to isolate the effect of other events from a short event window and calculate cumulative abnormal returns (CARs). Kale et al. (2002) argue that the CARs clearly represent how investors perceive the ability of each partnership to increase the market value of the firm.

Chapter 3 Research design

This chapter explains the selection and application of the research methodology that begins with the selection of a research paradigm which defines ontology, epistemology, methodology, and method. Research design aims to align researcher's choice of research paradigm with an appropriate research methodology to address research objectives (Lincoln, Lynham, & Guba, 2011). The objectives of this study are to firstly scientifically examine the extent of financial performance variations, as the change in the market value of firms that initiated economic, environmental, and social activities in partnership, and then investigate what factors influenced it. This research, therefore, examines the causal relationship between partnership and financial performance through quantification and examines further the factors affecting this relationship. Therefore, the goals of this chapter are:

- Provide an overview of the three studies
- Justify the choice of research paradigm
- Explain the quantitative research approach
- Justify the choice of research methodology
- Explain the method to achieve research objectives

3.1 Overview of the studies

Using service-dominant logic (Vargo & Lusch, 2016) and a resource-based (Barney, 1991) view as a theoretical lens, the first study examined how the market value of logistics service providers is affected when they partner with customers, IT providers or competitors to develop IT-enabled logistics service innovations. A multi-country event study, using secondary data collected from Factiva and DataStream, investigated how the market value of logistics service providers changes when they set up partnerships with other entities to

develop IT-enabled service innovations. Hierarchical regression analysis is used to identify how different firm-level factors such as firm size, growth potential, partnership experience, and alliance partners influence the direction and the strength of the market value change to the announcements.

The second study is built on the natural resource-based view (NRBV) (Hart, 1995) and relational view (Dyer & Singh, 1998) of the firms to investigate how the market value of firms change when they announced the partnership to initiate CE practices. The data were collected from Factiva and DataStream to conduct a multi-country event study. The NRBV theorised three levels of strategic capabilities for environmental sustainability from firm-level to global level, namely, pollution prevention, product stewardship, and sustainable development. The relational view provided a link between CE practices and financial performance. A hierarchical regression analysis was conducted to examine the moderating effect of prior environmental performance, growth opportunities, and financial slack.

The third study used signalling theory (Spence, 1974), a resource-based view (Barney, 1991), and resource dependence theory (Pfeffer & Salancik, 2003) to examine the effect of partnership for initiating social activities on the financial performance, measured as the change in the market value of firms, using an event study method. The sample and data were drawn from Factiva and DataStream of the US firms only. Hierarchical regression analysis is conducted to investigate the moderating effect of priority of social initiatives, proactivity, growth opportunities, financial slack, and visibility.

3.2 Choice of research paradigm

Researchers use an existing research paradigm, often known as a theoretical perspective that encompasses the researcher's philosophical position in ontology, epistemology, methodology and method. Scholars who take the different ontological position affect the

epistemological position that leads to different methodology and method to address the research question.

Ontology is about how a researcher perceives the nature of reality. This study assumed that the social world consists of real objects, identified with different shapes and properties but they are not perfect and can only be probabilistically distinguishable. This ontological inference leads to the "study of being" (Crotty, 1998; Gray, 2013; Guba & Lincoln, 1994). The research questions formulated in Section 1.2.1 – 1.2.2 and the overview of the studies provided in Section 3.1 view reality as objective and assume that knowledge exists independently of the researcher. The researcher creates new knowledge after verifying/falsifying hypotheses. The knowledge creation process begins with the definition of propositions or constructs, leading to the formation of hypotheses that form causal relationships in the real world (Gray, 2013).

The epistemological assumption for this research is based on an analytical approach, embedded in objectivism that means knowledge is obtained through experience.

The theoretical perspective adopted for this research is 'positivism' (Gray, 2013). The positivist approach relies on quantitative research methods to scientifically inquire into a phenomenon of interest; for example, the phenomenon of interest of this study is "partnership for sustainability initiatives". This accentuates deductive logic to demonstrate hypothesised relationships between variables. More specifically, causal hypothesis testing is suitable for mature science: when a researcher seeks to match his basic assumptions with the scientific findings, and the goal is not an exploration of unknowns, but the challenge is to investigate what is known for new insights (Kuhn, 2012). Cooper and Schindler (2014) claim that the nature of variables, such as dependent or independent variables, is clear when interpreting causal relationships in terms of direction. The hypothesised relationships are

the obvious outcomes of deductive reasoning where a researcher seeks to test whether the relationships hold or not through running an appropriate statistical experiment.

Quantitative research methods primarily use quantifiable data for statistical analysis (Cooper & Schindler, 2014). The choice of data collection methods between primary and secondary sources depends on the procedures that fit the research problem and the complexity associated with the quantification of variables of the phenomenon of interest. Primary data collection methods, for example, experiments, quasi-experiment, surveys, interviews, observations or focus groups, fit to match different methodological criteria (Cooper & Schindler, 2014). Experiments or quasi-experiments are used for strong causal inferences between the phenomenon of interest and the respondents' actions (Cooper & Schindler, 2014). A survey of a large sample of respondents using a structured questionnaire helps with understanding the quantitative variations in the observations, feelings, attitudes, experiences or opinions of respondents which affect the phenomenon of interest (Cooper & Schindler, 2014). Interviews, observations or focus groups use a large amount of data from small purposive samples to shed light on how a phenomenon of interest is actioned or being actioned using representative qualitative data (Yin, 2013).

Partnership is a complex phenomenon. It involves actions and decisions, such as whether partnership is an appropriate option to achieve an objective or not, who to partner with, and how a partnership will be operationalised and benefits shared. However, one of the difficult things is to measure the financial impact of partnership for a phenomenon of interest, for example, sustainability in the supply chain context. Primary data are used to understand respondents' actions, behaviours, attitudes, or opinions about partnership for sustainability initiatives and their perceptions of its financial impact in the present time and how it might impact in the future. It will be extremely expensive, if not impossible, to quantify the

financial impact of a specific sustainability initiative using historical data collected from the survey or case study. For example, to determine how a certain advanced IT-enabled logistics service affected financial performance in the past, a researcher may need to identify and interview participants involved in the implementation of the technology to understand its effect on financial performance. The primary data needed for this study may be time consuming and expensive.

Several inherent difficulties exist in quantifying the impact of sustainability initiatives. The main challenge is the interpretation of sustainability performance due to the use of both quantitative and qualitative measures for economic and environmental impact and qualitative measures for social effect (Sridhar & Jones, 2013). The measurement system raises the question of objectivity and reliability due to the wide choice of measures available to the managers. For example, Global Reporting Initiatives (GRI) provides 79 quantitative and qualitative indicators of non-financial information, making it difficult to reconcile an overall financial impact especially for environmental and social initiatives (Sridhar & Jones, 2013). Additionally, Chen et al. (2017) in their literature review found most studies on the impact of sustainability practices on firm performance relied on surveys, case studies or financial statistics from annual or quarterly reports. While such studies are valuable for understanding the financial impact of more long-horizon events or managers' perceptions, they are less useful for capturing the short-term financial impact of sustainability initiatives.

This study aims to overcome this gap by using stock-market reactions to do so. Unlike long-term studies, short-horizon studies help managers understand how their economic, environmental and social initiatives are viewed by investors, whose perceptions affect firms' future financial performance. A change in market value, also known as stock market

reaction, is a good measure to determine quickly whether or not sustainability initiatives can influence future financial performance (McWilliams & Siegel, 1997).

Therefore, a secondary data collection method is found suitable to examine how the financial performance, measured as the change in the market value of firms, has increased/decreased in the past in response to the partnership announcements of economic, environmental, and social sustainability initiatives. More specifically, the investors' perspectives are analysed statistically using an event study methodology that matches with the positivist paradigm (Coutts, Mills, & Roberts, 1994).

3.3 Advantages and disadvantages of event study methodology

A significant amount of logistics and supply chain research uses primary data collection methods (Töyli, Häkkinen, Ojala, & Naula, 2008). On the one hand, it provides the researcher with the flexibility to formulate different types of research questions and collect a suitable form of data. On the other hand, low response rates, motivation to participate in a study, and subjective bias are of major concern related to primary data collection methods that undermine the confidence in the validity of research findings (Boyer & Swink, 2008). Self-reported perceptual data obtained from survey studies or interviews measure logistics performance in terms of the firm's ability to meet responsiveness, flexibility, and estimated customer satisfaction using managers' notion such as "strongly agree" or "above industry average" or rating firm's responsiveness compared to the competitors using Likert scale. These measures are known as "perceptual measures" or quasi-perceptual measures" respectively (Ketokivi & Schroeder, 2004). However, "direct measures", such as analysis of financial reports and stock market studies, commonly used in economics studies, are not popular in logistics and supply chain research (Ketokivi & Schroeder, 2004; Töyli, Häkkinen, Ojala, & Naula, 2008). According to Toyli et al. (2008), a measure of financial performance

that relies on the perception of respondents at one particular point in time may suffer from informant biases and lack of control over research process (Ellram & Tate, 2016). Secondary data collected from commercial databases, news media, government agencies, and other reliable sources tend to reduce biases and improves control over collecting a large amount of data. Additionally, prior studies have found suitability of secondary data to measure well-established typical financial performance in terms of shareholder value and market growth, and it is increasingly gaining importance in logistics and supply chain research (Ellinger et al., 2011; Hendricks & Singhal, 2003, 2009; Ellram & Tate, 2016). When compared with primary data, secondary data is easy to implement, standard, and objective, which help researchers improve the quality of research findings. Additionally, several recent articles advocate the use of secondary data for more contribution in this growing field of logistics and supply chain research (Boyer & Swink, 2008; Töyli et al., 2008; Roth, 2007). Therefore, this study analyses whether announcements related to economic, environmental, and social sustainability affect firms' market value change using an event-study methodology.

However, like any other research methods, event study also has certain limitations (Töyli et al., 2008). The first limitation is attributed to the limited availability of secondary data that may not be appropriate for the research needs. Secondly, secondary data is mostly available for large and publicly listed firms, making it difficult for a researcher to include small firms in research. This research addresses the first limitation by collecting data from an easily available electronic database such as Factiva, using the name of the logistics firms, event date, stock returns, and a stock index for analysis. The second limitation is addressed by clearly defining the research objective that is to analyse the effect of partnership for three dimensions of sustainability viz-a-viz economic, environmental, and social announcements

made by publicly listed firms on the firms' market value to understand the effect of partnership. The next section discusses the assumptions in the event study methodology.

3.4 Assumptions in the event study methodology

Event study methodology is primarily based on three assumptions (Brown & Warner, 1980). The first assumption is that the stock market is efficient, based on the efficient market hypothesis. The second assumption is that the events are unexpected, and the stock market has not absorbed the information and reflected the effect of the event into stock prices. The final assumption is that there is no other financially relevant information within the event window, which could be liable for the stock price changes.

3.4.1 Efficient market hypothesis

The efficient market hypothesis espouses the view that the stock prices at any point in time fully reflect all available information including past information (e.g. earnings in the last quarter) as well as current, and events that have been announced with future implications (e.g. partnership for circular economy) (Fama, 1970). Investors cannot earn abnormal returns (returns above expectations factoring the amount of risk involved) in an efficient market using the value of information in their investing decisions. However, critics believe that the stock market overreacts to new information, which results in overvalued or undervalued stocks (Fama, 1970). The January effect, weekend effect, and behavioural finance are the counter arguments to the efficient market hypothesis where investors were able to gain abnormal returns. The efficient market hypothesis does not completely reject the possibility of market anomalies due to the arrival of new information that may provide investors with an opportunity to gain abnormal returns. Due to the complexity involved in analysing market efficiency, Fama (1970) proposed three categories based on information subsets: a weak form of market efficiency, a semi-strong form of market efficiency, and a strong form of market efficiency.

A weak form of market efficiency indicates that the historical price information is reflected in the current stock prices, and there is no value in predicting changes in future stock prices (Fama, 1970). In other words, today's stock prices reflect all past price information that would not provide investors with an opportunity to analyse this data to earn abnormal returns in the future. Statistical tests, for example, time series forecasting, are employed to assess a weak form of market efficiency. The tests analyse whether stock price changes are independent of past price information or not.

A semi-strong form of efficiency involves not only past price information but all publicly known and available data such as dividends, earnings, announcements of new product development, etc. There are no benefits for investors, for example, acting on publicly available information and expecting to earn abnormal returns (Fama, 1970). It is generally believed that when new information arrives, it spreads very quickly, and is absorbed, and reflected in the stock prices without delay. This is due to the competition among investors seeking abnormal returns, which drives stock prices to their correct values provided information is unbiased. However, if there is a delay in the adjustment of stock prices to publicly available announcements, investors can exploit the lag to earn abnormal returns. An event study is used as an empirical research method to test the semi-strong form of market efficiency that examines the speed of investor reaction to publicly available announcements that may cause changes in the stock prices.

The strong form of market efficiency is the strongest version and includes historical price, all publicly available, and all private information, known as access to monopolistic information, and does not result in abnormal returns (Fama, 1970). This form of efficiency asserts that it not possible for investors to use any information, including private information, to earn abnormal returns. The strong form of market efficiency examines

whether investors that have monopolistic access to information gain consistent abnormal returns or not.

3.4.2 Unexpected events

The second assumption of event study methodology is that the events that are not expected by the investors cause fluctuations in the stock prices of public listed firms. Events are the phenomena of interest common to many firms that are communicated to investors through news announcements, for example, earning announcements, dividend announcements, partnership announcements, or innovation announcements (McWilliams & Siegel, 1997). The element of surprise in the announcements affects the trading behaviour of investors leading to change in the stock prices. Investors' buy and sell behaviour causes the market price to adjust to the value of unexpected information within a short duration after the information flows into the market. If the stock price of the announcing firm remains unchanged, then the information is anticipated by the investors, or it has no value that may affect the firm's future cash flows (Kothari & Warner, 2007).

3.4.3 Confounding events

The third and final assumption of event study methodology is the event (i.e. phenomenon of interest) is not combined with similar or other financially relevant events, known as confounding events, that may influence the trading behaviour of investors (Kothari & Warner, 2007). If the phenomenon of interest combines with confounding events occurring concurrently, any stock price changes are due to the combined effects of all events, and it will be difficult to isolate stock price changes in whole or in part relevant to the phenomenon of interest from the combined effects of all events.

3.5 Calculation of cumulative average abnormal returns (CAARs) or (CARs)

Abnormal returns are calculated after collecting all the relevant announcements related to the phenomena of interest (events) across different firms. These firm-specific events are

time-independent across different firms that have a different effect on stock prices. The differences between observed and expected stock returns (abnormal returns) are then aggregated around the period in which the study examines the effect of the events, and statistical tests are performed to test the hypothesis (Brown & Warner, 1980). Kothari and Warner (2007) emphasise the essential feature of the event study approach is its robustness to specific methodological choices that include the length of the estimation window, event window, models to generate returns and the statistical tests. The foremost important thing in the event study is to confirm the announcement dates were the earliest available to the market to test whether or not the events were unexpected and/or have a value that can affect future cash flows. The sample characteristics, selection of estimation window, event window, and the return models to calculate abnormal returns are discussed below.

3.5.1 Sample characteristics

There are five major concerns related to the sample: size, normality assumption, event-induced volatility, event-date clustering and cross-correlation.

Adequacy of sample size depends on the assumption of whether or not it can detect a change in the market value of firm with sufficient statistical accuracy to draw accurate and credible conclusions (Mackinlay, 1997). In other words, if an event has an impact on the firm value, what sample size would be big enough to detect that effect with certain statistical accuracy? This can be discussed in the form of null and alternative hypotheses by estimating the strength and direction of results while assuming that alternative hypotheses will have an economic impact. Mackinlay (1997) created a sample of 600 announcements of 30 firms and examined the relationship between power and the number of announcements based on probability to detect a varying degree of abnormal returns for different short-horizon event windows. Mackinlay (1997) has taken a sample of 25 announcements, analysed using

a one-day event window, and a two-sided test with 5% significance level. The test statistics revealed that, with the sample of 25, the probabilities of detecting the change in abnormal returns of 0.5%, 1%, and 2% were 24%, 71%, and 100%. When he increased the sample from 25 to 100, the probabilities were 71%, 100% and 100% to detect 0.5%, 1%, and 2% change in the abnormal returns respectively. These results imply that a sample of 100 announcements would be sufficient to detect a 1% change in the firm value with 100% accuracy (Mackinlay, 1997).

The second issue is related to the normality assumption. The underlying assumption in the event study analysis is the abnormal returns data are normally distributed. In support, Brown and Warner (1985) report that non-normality of US stock returns did not have any noticeable impact on event study analysis and the significance of statistical tests were well specified in samples with as few as five stocks.

However, in the multi-country event study analysis, most stock market data are unlikely to follow a normal distribution (Campbell, Cowan, & Salotti, 2010). The Patell Z-test, the most commonly used parametric statistical test method, utilises this assumption. This may lead to potential spuriousness of event study analysis. In this case, non-parametric tests such as rank test and sign test are used to address the non-normal distribution of abnormal returns (Campbell et al., 1997).

The third issue is event-induced volatility. This occurs due to an increase or decrease in stock returns when events take place. The problem of event-induced variance has been the topic of discussion in literature. Brown and Warner (1985) report variance of stock returns can result in misspecification of standard test statistics, but these can be improved through better modelling of the variance process. Other studies such as Higgins and Peterson (1998), Harrington and Shrider (2007) and Aktas, de Bodt and Cousin (2007) also report that all

events cause an increase in cross-sectional variability and adjustments have to be made to all tests used to calculate the statistical significance of abnormal returns from the event date. Boehmer, Musumeci, and Poulsen (BMP) (1991) suggest that the estimation-period standard deviation must standardise the event-period returns, and the cross-sectional mean of standardised returns should be divided by their cross-sectional standard deviation to generate the test statistics. BMP, a parametric test method, implicitly assumes that, for all securities in the sample, the event-induced variance is the same. Corrado (1989) uses the non-parametric rank test to address the issue of variation caused by events. Simulations show higher rank test power compared to parametric statistical tests.

This study has used both Corrado's (1989) rank test and the adjusted BMP test version proposed by Kolari and Pynnönen (2010). The BMP test statistics, developed by Boehmer et al. (1991), account for potential event-induced stock returns. Due to an event, the variance of stock return may increase (inflation of variance) or decrease (deflation of variance). For either of these cases, the BMP test, one of the most commonly used parametric methods in event studies, is efficient and has a high level of power (Kolari & Pynnönen, 2010).

The final issue related to the sample is event-date clustering that results in potential stock returns cross-correlation (Kolari & Pynnönen, 2010), such as in the present study with event-date clustering due to a common event date for some of the partnership announcements of different firms in the sample. Test results cannot, therefore, presume independence from abnormal returns. Kolari and Pynnönen (2010) show that, even when cross-correlation is relatively low, the clustering of event dates is significant in terms of over-rejecting the zero-average abnormal return hypothesis when it is true. This study has used corrections suggested by Kolari and Pynnönen (2010) to Patell (1976) and Boehmer et al. (1991) test

statistics to account for such correlations. Results for the corrected statistics reject the null hypothesis on average at around the nominal rate (Kolari & Pynnönen, 2010).

3.5.2 Estimation window

The estimation window is the period selected for estimating parameters of return models, for example, market model, CAPM, and multifactor model, etc. The estimation window has a start and end date relative to the event date; it can be small, for example, 60 days, or longer, for example, 250 days. There are benefits of using a large length of estimation window as it reduces the sampling errors of the parameters, so the magnitude of abnormal returns across time periods becomes independent asymptotically (Campbell et al., 1997); it also averages out the impact of unusual market movements, for example, market crashes due to terrorist attacks or similar events (Park, 2004).

3.5.3 Choice of market index

Given an estimation window, it is also necessary to choose the relevant market index, because the index with the highest explanatory power in the estimation window would be the best choice in the event study (Park, 2004). Past studies reported that the choice between equal-weighted (e.g. S&P 500) and value-weighted (e.g. CRPS) factors do not create significant differences in the estimation of abnormal returns (Chen, Roll, & Ross, 1986; Park, 2004; Yang, Wansley, & Lane, 1985). However, in cases where a large number of stocks are used in an event study, it may be beneficial to use a broad market index (e.g. CRPS), and local market indexes may be used in multi-country event studies (Park, 2004).

3.5.4 Event window

The event window is the period used to assess how long a stock market takes to absorb new information. The variance within the event window may be higher than in the periods outside the window because the market absorbs the new information (Hillmer & Yu, 1979). This is consistent with the semi-strong form of the efficient market hypothesis that argues

initially there can be some variations in the expected stock prices in response to the event but without any possibility of predicting future price changes. Chordia, Roll, and Subrahmanyam (2005) show that the stock prices are corrected within five minutes to an hour. Busse and Clifton Green (2002) found that the stock market reacts to the news published in CNBC Morning and Midday Call reports without delay, and the price is adjusted within 15 minutes.

In contrast, a few studies have used long event windows consisting of 10 days to 1 year as the market keeps responding to the news (Chang & Chen, 1989; Du & Boateng, 2015; Subramani & Walden, 2002; Yu, 2012). Fixed length event windows are appropriate for large samples as the overreaction or underreaction of one stock can be offset by the over- and underreaction of another stock. However, McWilliams and Siegel (1997) warn against using long event windows as it violates the assumption of efficient market hypothesis. Hence, the approach adopted in this study for assessing the event window started with removing confounding events in the three days. It continued by calculating abnormal returns three days before the event date and continuing three days after the event date to assess whether or not the abnormal returns one day before, on the event day, and one day after the event are significant. This is because consistent significant abnormal returns over several days may indicate the stock market has not absorbed the news and is still reacting to the information. All three event studies in this thesis confirmed insignificance of abnormal returns before and after the three-day event period to demonstrate market was not responding to the events and the results are reliable.

3.5.5 Return models

Event study methodology uses several models (e.g. market model and Fama-French 3-factor model) to calculate expected returns associated with announcements of the

phenomenon of interest. These expected return models predict expected returns that are subtracted from actual stock returns to estimate abnormal returns. Expected returns models can be divided into statistical (e.g. market model) and economic (e.g. Fama-French 3-factor model) models. The first category assumes behaviour of stock returns does not depend on the economic theory and they are "jointly multivariate normal and independently and identically distributed through time" (Campbell et al., 1997, p. 154). The second category relies on economic theory and restricts statistical assumptions to give more constrained normal return models (Campbell et al., 1997). The benefit of using a statistical model is the requirement of the assumption of stable distribution. If the normality assumption of returns does not hold, least-square interpretation of estimates can be used (Owen & Rabinovitch, 1983). This study has chosen the market model, the constant mean return model, and the Fama-French three-factor model based on the sample characteristics and robustness check. The market model is suitable for multi-country event studies (Park, 2004), and the constant mean return model and the Fama-French three-factor model are used for the robustness check. The Fama-French three-factor model is ideal for the US stock market as the data are readily available (Fama & French, 1993). Each of these models estimates changes in the stock returns in response to the particular announcements using various factors.

3.5.5.1 Market model

The market model (MM) is the most commonly used model in event studies. The MM does not explicitly assume how equilibrium stock prices are set. Rather, the linear model specification assumes joint normality of stock returns. For any stock j , the market return for period t (Campbell et al., 1997):

$$\overline{R_{jt}} = \alpha_j + \beta_j \overline{R_{mt}} + \overline{\varepsilon_{jt}} \quad (1)$$

where $\overline{\varepsilon_{jt}}$, is a mean zero, independent disturbance term in period t , also known as abnormal returns (ARs). Equation (1) divides $\overline{R_{jt}}$, into a systematic variable linearly related to $\overline{R_{mt}}$ and an unsystematic variable, $\overline{\varepsilon_{jt}}$ which is not correlated with $\overline{R_{mt}}$.

The unsystematic variable fully captures the effect of firm-specific events, assuming the information signal and $\overline{R_{mt}}$ are independent. Both α_j and β_j are calculated using OLS regression and subtracted from R_{jt} resulting in an abnormal return (Campbell et al., 1997).

$$\overline{AR}_t = \widehat{\varepsilon}_{jt} = R_{jt} - (\widehat{\alpha}_j + \widehat{\beta}_j \overline{R_{mt}}) \quad (2)$$

The market model can generally produce smaller variances in abnormal returns (relative to raw returns), resulting in more effective statistical testing and less correlation among abnormal returns, leading in a closer conformance to standard statistical tests. (Beaver, 1981). This model is widely used in multi-country event studies (Campbell et al., 2010; Park, 2004).

The mean abnormal returns for all firms at day t was calculated as follows:

$$\overline{AR}_t = \frac{1}{N} \sum_{i=1}^N AR_{it} , \quad (3)$$

where N is the number of firms in the sample. The cumulative abnormal returns (CARs) were calculated by summing up the mean abnormal returns in the event window $(-1, 1)$ as follows:

$$CAR(-1, 1) = \sum_{i=-1}^1 \overline{AR}_t \quad (4)$$

3.5.5.2 Constant mean return model

The constant mean return model assumes that ex-ante expected returns for a stock can differ across firms, but are constant over time (Strong, 1992).

$$R_{it} = \mu_i + \varepsilon_{i,t} \quad (5)$$

$$E(\varepsilon_{i,t}) = 0 \quad Var(\varepsilon_{i,t}) = \sigma_{\varepsilon_t}^2$$

Where μ_i is the mean return of stock i , R_{it} is the period- t return on stock i and $\varepsilon_{i,t}$ is the time period t disturbance term for security i with an expectation of zero and variance $\sigma_{\varepsilon_t}^2$.

μ_i is estimated by averaging the expected return in the estimation window:

$$\mu_i = \frac{1}{M_i} \sum_{i=T_0+1}^{T_1} R_{it} \quad (6)$$

where M_i is the number of non-missing returns over the estimation window.

Although the constant mean return model can be the simplest, previous studies have findings that are close to those of more complex models, such as market model (Brown & Warner, 1980, 1985). The fact that the variance of abnormal returns is typically not significantly reduced when using advanced models should relate this lack of sensitivity to the model. This model is usually applied to normal returns in short-horizon event studies using daily data; it is used in this study to test the robustness of the results (Mackinlay, 1997).

3.5.5.3 Fama-French 3-factor model

Fama and French (1993) have developed a three-factor model to improve the explanatory power of average stock returns. These factors include an overall market factor, firm size, and book-to-market ratio. The expected excess return of the stock i is given by:

$$(R_{it} - r_{ft}) = \alpha_i + \beta_{i,m} (R_{m,t} - r_{f,t}) + \beta_{i,SMB_t} SMB_t + \beta_{i,HML} HML_t + \varepsilon_{i,t} \quad (7)$$

Where: r_{ft} is a risk-free return in any period; α_i , and β_i are the factors used in the model estimated with OLS regression; $R_{m,t}$ is the estimated return rate for the stock i that is

presumed to depend on the market portfolio return rate for day t . SMB_t means 'small minus big', and HML_t means 'high minus low' in any period. The SMB_t factor captures the stock return of small over big firms (measured by market capitalisation). The factor HML_t records the excess stock return of high market-to-book ratio over stocks with a low market-to-book ratio.

3.6 Statistical significance tests in the event study analysis

The reliability of the event study analysis is primarily based on the robustness of the statistical test results. Researchers use several parametric and non-parametric statistical tests to justify their findings. The following section summarises both types of statistical tests and highlights their advantages and disadvantages based on the assumptions about the probability distribution of abnormal returns, their cross-correlations, event induced variance, and clustering effect.

Let,

$$\tau_1 = T_1 + T_0 + 1 \quad (8)$$

Where: τ_1 is the estimation window length with T_0 as the earliest day of the estimation window, and T_1 as the latest day of the estimation window relative to the event day and $\tau_2 = T_2 - T_1$ is the event window length with T_2 as the latest day of the event window relative to the event day (Figure 1).

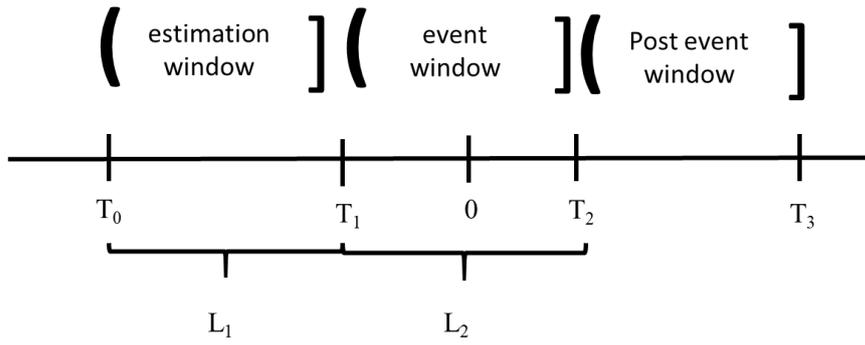


Figure 1: Event window lengths

3.6.1 Time series t-test

Time series t-test is the classic parametric test based on the assumption that abnormal returns follow a normal distribution and the abnormal returns are cross-sectionally uncorrelated (Mackinlay, 1997; McWilliams & Siegel, 1997). The time series t-test checks the difference between the statistical value of the actual and the expected returns. The null hypothesis of a t-test is that the abnormal returns are not statistically significant, and the alternate hypothesis rejects the null hypothesis.

$$t_{AR_{i,t}} = \frac{AR_{i,t}}{S_{AR_i}} \quad (9)$$

$$S^2_{AR_t} = \frac{1}{M_i - 2} \sum_{t=T_0}^{T_1} (AR_{i,t})^2 \quad (10)$$

$$S^2_{AR_t} = \frac{1}{M_i - 2} \sum_{t=T_0}^{T_1} (AR_{i,t})^2 \quad (11)$$

$$t_{CAR} = \frac{CAR_i}{S_{CAR}} \quad (12)$$

The standard error is adjusted to account for the event window by the forecasting error which is an out-of-sample prediction. The adjustment in the market model:

$$1 + \frac{1}{M} + \frac{(R_{M,t} - \bar{R}_{m,EST})^2}{\sum_{EST_{min}}^{EST_{max}} (R_{M,t} - \bar{R}_{m,EST})^2} \quad (13)$$

3.6.2 Cross-sectional t-test

The cross-sectional t-test is the second type of parametric test. This approach suggests that, as the time-series t-test suggests that realised abnormal returns are independent and identically distributed. The t-statistics are calculated by dividing the mean CARs by its cross-sectional CARs' variance.

$$T_{cross} = \frac{CAAR(T_1, T_2)}{\hat{\sigma}_{CAAR(T_1, T_2)}} \quad (14)$$

The null hypothesis of this test is the CARs are zero. The standard deviation of the test is estimated using cross-sectional CARs.

$$\hat{\sigma}^2_{CAAR(T_1, T_2)} = \frac{1}{N(N-1)} \sum_{i=1}^N [CAR_i(T_1, T_2) - CAAR(T_1, T_2)]^2 \quad (15)$$

The cross-sectional t-test does not take into account the estimation window variance. Hence, this test method has low power because if the variance is different between sample firms, known as the event-induced volatility, or if the abnormal returns are correlated between firms, the test statistics may be mis-specified (Brown & Warner, 1985).

3.6.3 Standardised residual test (Patell test)

The Patell test, the third type of parametric test, is also known as the standardised residual test; it examines the null hypothesis of whether or not the CARs is zero. This test is robust to heteroscedastic abnormal returns estimated in the event window (Patell, 1976). In contrast to cross-sectional t-test, the Patell test (1976) includes the variance of abnormal

returns into the model. However, it assumes that there is no correlation between abnormal returns and the variance over time is constant, and the estimated standard deviation for each abnormal return is standardised.

$$SAR_{i,t} = \frac{AR_{i,t}}{S(AR_i)} \quad (16)$$

$$\hat{\sigma}_{AR_i}^2 = \frac{1}{M_i - 2} \sum_{t=\tau_1}^{\tau_2} (AR_{i,t})^2 \quad (17)$$

M_i is the number of non-missing abnormal returns. As the increase in the variance of abnormal returns for the event window is predicted outside the estimation window, the standard error is adjusted by a forecast error (Patell, 1976).

$$S(AR_i) = \hat{\sigma}_{AR_i} \sqrt{1 + \frac{1}{M_i} + \frac{(R_{M,t} - \bar{R}_{m,EST})^2}{\sum_{EST_{min}}^{EST_{MAX}} (R_{M,t} - \bar{R}_{m,EST})^2}} \quad (18)$$

The cumulative standardised abnormal returns are estimated:

$$CSAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} \frac{AR_{i,t}}{S(AR_i)} \quad (19)$$

The SAR_i distribution is a studentised distribution with $M-2$ degrees of freedom (market model) under the null hypothesis (Campbell et al., 1997). The predicted $CSAR_i$ value is zero, and the standard deviation is as follows:

$$(CSAR_i) = \sqrt{(T_2 - T_1 + 1) \frac{M_i - 2}{M_i - 4}} \quad (20)$$

Test statistics for the null hypothesis is given by:

$$T_{Patell} = \frac{1}{\sqrt{N}} \sum_{i=1}^N \frac{CSAR_i (T_1, T_2)}{S(CSAR_i)} \quad (21)$$

3.6.4 Standardised cross-sectional residual test or BMP test

The standardised cross-sectional residual test is the fourth type of parametric test. This is a test developed by Boehmer, Musumeci and Poulson (1991) that addresses the assumption of the standardised residual test (Patell (1976)). This test is robust to the event-induced variance in the event window; the test combines the standardised residual test with the predicted event-induced variance based on the cross-sectional event-window abnormal returns (Boehmer et al., 1991).

First, the abnormal returns are standardised:

$$CSAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} \frac{AR_{i,t}}{S(AR_i)} \quad (22)$$

Then, the cross-sectional average of $CSAR_i (T_1, T_2)$ is estimated:

$$\overline{CSAR} (T_1, T_2) = \frac{1}{N} \sum_{i=1}^N CSAR_i (T_1, T_2) \quad (23)$$

The cross-section of abnormal returns in the event window is used to determine the standard deviation:

$$S(\overline{CSAR}) = \sqrt{\frac{1}{N(N-1)} \sum_{i=1}^N [CSAR_i (T_1, T_2) - \overline{CSAR} (T_1, T_2)]^2} \quad (24)$$

Test statistics for the null hypothesis is given by:

$$T_{BMP} = \frac{\overline{CSAR}(T_1, T_2)}{S(\overline{CSAR})} \quad (25)$$

Kolari and Pynnönen (2010) have suggested the adjusted version of the standardised cross-section residual test to address average cross-correlation among abnormal returns in the event window:

$$T_{BMP,t} = T_{BMP,t} \sqrt{\frac{1 - \bar{r}}{1 + (N - 1)\bar{r}}} \quad (26)$$

Where \bar{r} is the average cross-correlation among abnormal returns. If \bar{r} is equal to zero, the test statistics results will be similar to the standardised cross-section residual test.

3.6.5 Corrado rank test

Corrado rank test is a type of a non-parametric test developed by Corrado (1989) that eliminates the requirement of the normal distribution of abnormal returns. Furthermore, the test is robust against event-induced variance (Campbell & Wesley, 1993) and cross-correlation due to event-day clustering (Kolari & Pynnönen, 2010).

First, the sample's abnormal return of each firm is converted to ranks over the entire period of the estimation window and the event window.

$$K_{i,t} = \text{rank}(AR_{i,t}) \quad (27)$$

The test then compares the ranks for each firm in the event window with the predicted average rank while taking account of the null hypothesis of no abnormal returns

$$U_{i,t} = \frac{K_{i,t}}{(1 + M_i)} \quad (28)$$

M_i is the number of non-missing returns for each observation.

The test statistics for the null hypothesis is given by:

$$T_{Corrado} = \frac{1}{\sqrt{N}} \sum_{i=1}^N \frac{(U_{i,t} - 0.5)}{S(U)} \quad (29)$$

The estimated standard deviation is:

$$S(U) = \sqrt{\frac{1}{L_1 + L_2} \sum_t \left[\frac{1}{\sqrt{N_t}} \sum_{i=1}^{N_t} (U_{i,t} - 0.5) \right]^2} \quad (30)$$

N_t is the number of cross-sectional non-missing returns at $\tau = t$.

Cowen and Sergeant (1996) demonstrate that the rank test is more robust and powerful than the parametric tests when return variability does not increase. The test is mis-specified with increased variability. A standardised cross-sectional test is adequately defined for the upper-tailed test developed by Boehmer et al. (1991). The generalised sign test can best evaluate the lower-tailed alternatives (Corrado & Zivney, 1992).

3.6.6 Generalised sign test

The sign test is a binomial test to determine if the proportion of positive abnormal residuals in the sample is more than 50% of the stock market reaction to an event (Brown & Warner, 1980). The generalised sign test is an advanced version of the non-parametric sign test, which compares the ratio of the number of observations with positive abnormal returns in the event window and the number of stocks in the period not affected by the event (Cowan, 1992). The test does not require the abnormal returns to be normally distributed. The generalised sign test shows more power than a parametric test based on standard errors computed from the cross-section of abnormal returns on the event date (Cowan, 1992).

The number of stocks with positive CARs is predicted to match the fraction P of the positive CARs from the estimation period for the null hypothesis of no abnormal returns. If the number of positive CARs is considerably higher than that of the expected proportion, the null hypothesis should be rejected.

The fraction P is estimated as:

$$P = \frac{1}{N} \sum_{i=1}^N \frac{1}{\tau_1} \sum_{t=T_0}^{T_1} \varphi_{i,t} \quad (31)$$

The test statistic for the generalised test is:

$$PZ_{GS} = \frac{P_0 - P}{\sqrt{P(1-P)N}} \quad (32)$$

Where P_0 is the number of non-negative abnormal returns estimated in the event window and the test statistics follows a standard approximation of the binomial distribution with parameters P . N is the number of stocks in the sample.

3.6.7 Wilcoxon rank test

This test is the extension of generalised sign test as it considers both the sign and the magnitude of the abnormal returns, assuming that no absolute values is equal non-zero (Wilcoxon, 1945).

$$W_t = \sum_{i=1}^N \text{rank}(A_{i,t})^+ \quad (33)$$

Where $\text{rank}(A_{i,t})^+$ is the positive rank of the absolute value of abnormal returns and $A_{i,t}$ is the abnormal returns at time t for firm i .

The test statistic for the Wilcoxon test is:

$$Z_{wilcoxon,t} = \frac{W - N(N - 1)/4}{\sqrt{(N(N + 1)(2N + 1)/12)}} \quad (34)$$

If N is large, according to the null hypothesis of equally likely positive or negative abnormal returns, the distribution of W_t is essentially a normal distribution.

3.7 Hierarchical regression analysis

Abnormal returns for a sample of firms expected to be impacted by a set of hypothesised firm characteristics, for example, firm size, firm age, or growth potential, etc. are regressed cross-sectionally (across different firms or industries) to assess the magnitude of the impact of firm characteristics on abnormal returns. The relationship between abnormal returns and firm-specific variables can be written in accordance with Sefcik and Thompson (1986):

$$\tilde{\gamma}_j = \beta_0 + \beta_1 X_{1j} + \dots + \beta_L X_{Lj} + \varepsilon_j \quad (35)$$

$$E(\varepsilon_j) = 0 \quad (36)$$

Where $\tilde{\gamma}_j$ represents a $J \times 1$ matrix of abnormal returns. Each row j of the matrix is an abnormal return of a stock or asset. X_{lj} , where $l = 0, 1, 2, 3, 4, \dots, L$ is a set of firm-specific variables associated with j row of abnormal returns. The parameter β_l , where $l = 0, 1, 2, 3, \dots, L$, assumed to be constant across firms, indicates the sensitivity of the event impact on the firm characteristics. ε_j is a disturbance term, uncorrelated with x 's.

The ordinary least square regression (OLS) method is frequently used in linear regression analysis, mainly due to the simplicity of calculation to fit the model. The OLS estimators have very good and suitable properties subject to fulfilling three assumptions (Wilcox & Keselman, 2012):

Firstly, the dependent variable follows a normal distribution. Secondly, homoscedasticity, which is implausible to exist in many applicable settings, is part of the assumption of the OLS regression model. Homoscedasticity occurs when the dependent variable's variance is independent of the values of the independent variable(s). The third assumption is the regression line is straight with one independent variable and, for several independent variables, the regression surface is a plane. The accuracy of the results and the power of testing hypotheses depend primarily on how well the model's assumptions are fulfilled (Wilcox & Keselman, 2012).

3.7.1 Outliers and heteroscedasticity

Outliers and heteroscedasticity are both key concerns in multi-country event studies that influence the reliability of regression results. Campbell et al. (2010) argue that a sample of multi-country event study can be very heterogeneous, because stock markets vary in many respects, such as the size, liquidity, volume of trade, marketing mechanisms, accounting standards, securities regulation, investor protection, property concentration and corporate governance. The statistical properties of stock returns can be affected by market characteristics, and the average mean returns are likely to be distorted by outliers that conform to non-normality (Campbell et al., 2010).

An outlier is described as an irregular (or 'bad') observation in comparison with regular observations ranging between $-\infty$ to $x - 3\sigma$ and ∞ to $x + 3\sigma$ for which a standardised or studentised residual is large (Hekimoğlu, 1997). Robust statistics are assumed to represent random samples from regular (or 'Good') observations from a normally distributed dataset with a mean of μ and variance of σ^2 . Outliers occur unexpectedly in the measurements with different characteristics. Hekimoğlu (1997) classified outliers in two broad categories: random outliers and influential outliers. The signs and magnitudes of random outliers

change randomly, for example, having extreme values on x – axis, y – axis or xy axis (Figure 2). In contrast, influential outliers have the same signs, but they can vary randomly in magnitudes to influence the slope of the regression equation inappropriately (Figure 3).

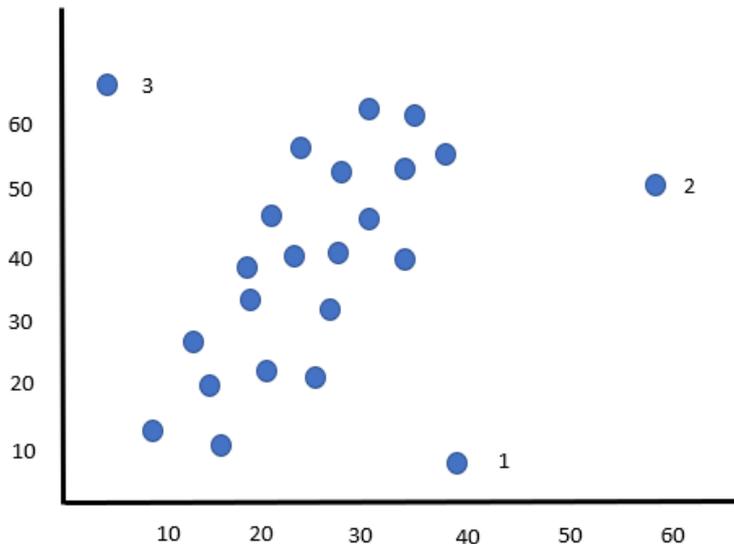


Figure 2: Examples of three types of random outliers. Point 1 is an outlier for X . Point 2 is the outlier for Y . Point 3 is an outlier for both X and Y . These three outliers are at the same distance from the mean, equal to three standard deviations. (Source: Author's interpretation)

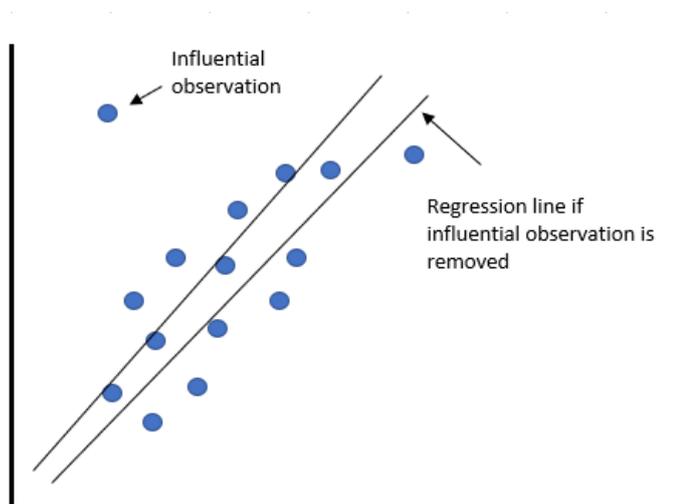


Figure 3: Influential observation. (Source: Author's interpretation)

Outliers make the regression model heteroscedastic (Alih & Ong, 2015). Heteroscedasticity is a concept that refers to heterogeneity or inequality of variances in a sample (Dutilleul & Legendre, 1993). When testing hypotheses, it is an essential precondition

to address heteroscedasticity for valid statistical inference. The statistical inferences in event studies are often based on estimating average abnormal returns using the standard deviation as a measure of the normal fluctuation of abnormal returns. If the sample size is small, the test for the impact of outliers is more important. A few high magnitude outliers or a few low magnitude outliers can, therefore, have a significant impact on the calculated mean abnormal returns. Consequently, the means resulting from either high magnitude outliers or low magnitude outliers have a chance of being different and the probability of Type-I errors increases. Similarly, the presence of both low and high magnitude outliers increases the standard deviation, decreasing the chance of detecting a significant difference and thereby increasing the probability of Type-II errors.

The OLS estimators are unbiased in the case of heteroscedasticity. The negative effect of heteroscedasticity, however, is that the OLS Covariance Matrix (OLSCM) parameter estimator, whose diagonal elements are used to calculate standard errors for the coefficients of the regression, is biased and inconsistent. As a result, the t-test of individual coefficients relies on the type of heteroscedasticity, either too liberal (Type I error) or too conservative (Type II error). The consistency problem of the estimator is solved by means of a heteroscedasticity Covariance Matrix (HCCM) introduced by White (White, 1980).

While OLS estimators are not affected by heteroscedasticity, the presence of outliers can severely impact the reliability of estimators. Prior studies argue that the presence of a few outliers can make the OLS regression method for estimating standard errors meaningless (Cousineau & Chartier, 2010; Wilcox & Keselman, 2012). To ensure the reliability of the results, this study has adopted a three-step process. Firstly, the outliers are identified. Secondly, the presence of heteroscedasticity is confirmed. Finally, if both outliers and

heteroscedasticity are present, a robust regression method using weighted least squares is used. If heteroscedasticity without outliers is present, White's method is used.

3.7.1.1 Tests for outliers

Three common tests are primarily used to assess the impact of potential outliers in the regression analysis:

DFFITS is a condition that shows how influential an observation is in the statistical regression analysis (Belsley, Kuh, & Welsch, 1980). It is known as the Studentised DFFIT, where the DFFIT is the change in the predicted value after removing the influential observation from the regression. The studentising is determined by dividing the change in the predicted value for observation to the approximate standard deviation of the fit at this point:

$$DFFITS = \frac{\bar{y}_i - \bar{y}_{i(i)}}{e_i \sqrt{h_{ii}}} = t_{i(i)} \sqrt{\frac{h_{ii}}{1 - h_{ii}}} \quad (37)$$

\bar{y}_i and $\bar{y}_{i(i)}$ are the predicted values of an influential observation i when it is included and omitted from the regression respectively; the standard error e_i results after removing the observation from the regression; and h_{ii} is the value of leverage for that observation. It can be observed from the equation that DFFIT is small at low leverage, but it increases to infinite when the leverage reaches 1. Kutner, Nachtseim, Neter, and Li (2005) suggest that if the absolute value of DFFITS is more than 1 for a small samples (<30 observations) and $2 \sqrt{\frac{p}{n}}$ for a large sample (>30 observations), the observation is influential, where p is the number of regression parameters and n is the number of influential cases.

DFBETAS measures the influence of an observation on the regression coefficients (Belsley et al., 1980). The absolute value of DFBETAS is calculated as the difference between the regression coefficient estimated when the model comprises an influential observation, and the coefficient when the model does not include the particular observation. It can have either a positive or negative value, showing an increase or decrease in the estimated coefficient. The value of DFBETAS is calculated using:

$$DFBETAS = b - b_{(-i)} = \frac{(X^T X)^{-1} x_i^T e_i}{1 - h_i} \quad (38)$$

Where X is $n \times k$ matrix of independent variables; e_i is $n \times 1$ residual vectors; b is the $k \times 1$ matrix-vector of estimates of some population parameter $\beta \in \mathbb{R}^2$; $b_{(-i)}$ denotes the coefficients estimated with the i_{th} value of omitted observation.

In contrast to the DFFITS and DFBETAS, Cook's distance (D_i) (Cook, 1979) considers the influence of a given observation i on all the n fitted value, obtained by:

$$D_i = \frac{e_i}{p s^2} \left[\frac{h_{ii}}{(1 - h_{ii})^2} \right] \quad (39)$$

Where p is the number of predictors for each observation known as the leverage of the i_{th} observation; s^2 is the mean squared error of the regression model; e_i represents the residual of the i_{th} observation. If e_i , or h_{ii} , or both have high values, the Cook's distance will be high, which calls for closure scrutiny of the observation in the analysis. Causinau (2010) found Cook's distance performed better compared to DFFITS and DFBB in identifying influential observations, which motivated this study to select Cook's distance as a method to identify outliers.

3.7.1.2 Tests for heteroscedasticity

After identifying the presence of outliers, heteroscedasticity is confirmed. The literature suggests three methods of detecting heteroscedasticity:

Visual inspection

The residuals are plotted against fitted values to perform a visual inspection test to detect if independent variables are suspected to be correlated with the error term. Heteroscedasticity is present if the residuals are larger near the distribution mean than at the extremes, as shown in Figure 4.

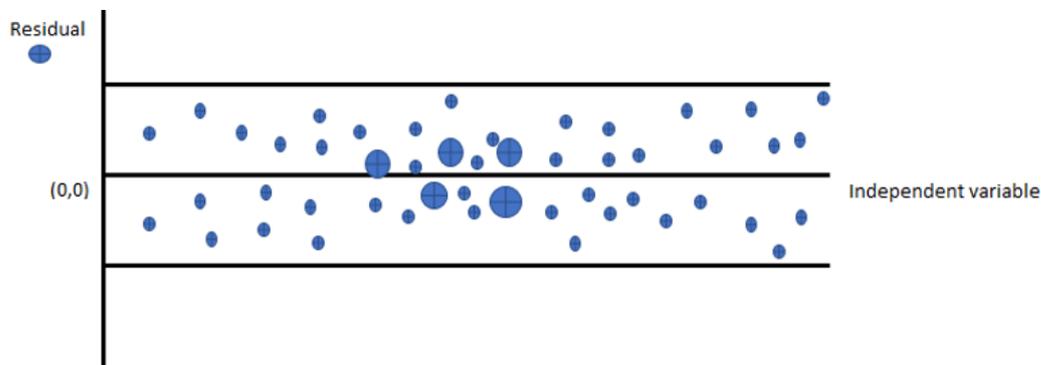


Figure 4: *Visual test for heteroscedasticity.* (Source: Author's interpretation)

Breusch-Pagan / Cook-Weisberg Test for Heteroscedasticity

The Breusch-Pagan test detects any linear type of heteroscedasticity (Breusch & Pagan, 1979). The null hypothesis is that all error variances are equal, and the alternate hypothesis is the error variances are the multiplicative function of one or more variables (Breusch & Pagan, 1979). The test is conducted as a three-step process:

First, OLS regression is performed and regression residuals are estimated.

$$y = X\beta + \varepsilon \tag{40}$$

Second, an auxiliary regression analysis is performed with regression residuals.

$$\varepsilon_i^2 = \gamma_1 + \gamma_2 x_{2i} + \dots + \gamma_k x_{ki} + \eta_i \tag{41}$$

Where x is independent variables.

Finally, the Lagrange Multiplier test statistic of the auxiliary regression with sample size N is performed.

$$LM = NR^2 \quad (42)$$

$$LM = \frac{NT}{2T - 1} \left[\frac{\sum_{i=1}^N \varepsilon_i^2}{\sum_{i=1}^N \varepsilon_i^2 \sum_{i=1}^T \varepsilon_{it}^2} - 1 \right]^2 \quad (43)$$

Where, ε_{it} is the OLS residuals. The test statistic is asymptotically distributed (χ_1^2) under the null hypothesis (Koenker, 1981).

White's General Test for Heteroscedasticity.

White (1980) proposed an estimator for heteroscedasticity-consistent standard errors (a special case of Breusch-Pagan). The White test determines whether or not the variance of the errors in a regression model is constant, which confirms the condition of homoscedasticity. In the auxiliary regression model (Eq. 40), the independent variables reflect the probability of the error variance based on the initial regressor values. If the error terms of the original models are homoscedastic, there will be statistically little deviation from zero in the auxiliary regression coefficients, which results in the smaller R squared value. The large R squared value would reject the null hypothesis of homoscedasticity.

The results of all three studies confirm that both influential observations and heteroscedasticity; therefore, the robust regression analysis is performed.

3.7.1.3 Robust regression

The robust regression method is applied to validate the estimation of parameters. A statistical procedure is robust if it justifies the parameter estimation when some of the assumptions of OLS regression method are not applicable, for example, in presence of outliers or influential observations (Fox & Weisberg, 2018). This is achieved by making sure

each observation affects the parameter estimates properly. A statistical procedure, for example, OLS, that handles all information, in the same manner, would result in the high influence for less precisely measured observations or little influence for more precisely measured observations. Robust regression operates by adding additional non-negative constants or weights to each parameter associated with data points into the fitted regression model. The weight size indicates the accuracy of the information associated with the observation that optimises the final parameter estimates. The weight of each observation is determined in the model relative to the weights of the other observations, so that absolute weights may have the same effect that would have resulted without influential observations (Fox & Weisberg, 2018). The three most commonly used estimators in the robust regression method are:

- i) M-estimation: a common least-square estimator, approximates maximum likelihood. In this approach, some of the data can be eliminated, which in some situations is not ideal as the sample size is reduced. Another drawback of M-estimation is that the data distribution is not taken into account and is not a function of the overall data because the mean is the weighted value only (Susanti, Pratiwi, Sulistijowati, & Liana, 2014).
- ii) S-estimation is a high breakdown value method. Unlike M-estimation, this approach defines a line (plane or hyperplane) that minimises the accurate approximation of the residual scale (from which the system derives the S in their name) (Susanti et al., 2014). This technique is highly resistant to leverage points and robust in response to outliers (Rousseeuw & Yohai, 1984).
- iii) MM-estimation maintains the robustness of S-estimation and the efficiency of M-estimation (Yohai, 1987). This procedure has both the high breakdown property,

and higher statistical efficiency than both the S- and M-estimation. The MM-estimation is intended to achieve estimates that have a high and more effective breakdown value, a standard measure of the proportion of outliers to be examined before such datapoints influence the results (Chen, 2002).

For a regression analysis, the selection of either M-estimation, S-estimation or MM-estimation was based on the relative impact of independent variables on the dependent variable, after each estimator was applied separately. The best performing estimator was selected for the analysis.

The following table summarises the decisions made for each study.

Table 2: Methodological decisions for each study

	Study 1	Study 2	Study 3
Ontology		Study of being	
Epistemology		Positivism	
Method		Quantitative	
Data source		Secondary	
Methodology		Event study	
Decisions related to the methodology			
Sample size	121 observations	105 observations	765 observations
Estimation window		250 days	
Event window		3 days	
Return models	Market and Constant mean return		Market and Fama-French 3-factor
Statistical Tests	Time series, Cross-sectional t-test, Patell Z, t-BMP, Corrado, and Sign test		Time series, Cross-sectional t-test, Patell Z, t-BMP, Wilcoxon, and Sign test
Cross-sectional regression		Robust	
Outlier test		Cook's distance	
Heteroscedasticity test		Breusch-Pagan / Cook-Weisberg	

Table 2 demonstrates that the theoretical paradigm for all three studies is positivism and quantitative research method is used. The procedure, similarities and differences in the studies are discussed as follows:

Firstly, the three studies used a rigorous method to collect samples from Factiva; DataStream and websites were used to gather data (e.g. stock prices, market return, revenue etc.) for the event study and regression analysis. The difference in the sample characteristics motivated the researcher to choose appropriate models to calculate abnormal returns. The first and the second study used samples from multiple countries, while the third study collected a sample from the United States. For all three studies, the market model was used to estimate the abnormal returns using a 250-day estimation window and a 3-day event window. The robustness of the results was checked with a constant mean return model for the first and the second study and a different model was used for the third study. The Fama-French model works better with the US firms. This method was used to test the robustness of Study 3 results. Parametric and non-parametric statistical tests were used to test the reliability of abnormal returns of all three studies. The parametric tests – time series t-test, cross-sectional t-test, Patell Z, and t-BMP - were used in all three studies. The non-parametric tests – Corrado rank test and sign tests - were used in the first and the second study. The third study used Wilcoxon and Sign tests as non-parametric tests.

Abnormal returns were used as a dependent variable in all three studies to measure the strength and direction of independent variables. In all three studies, the outlier and heteroscedasticity test confirmed the presence of influential observations. A robust regression method was used. Those cases with non-zero residuals were weighted down with Huber weighting in the first study and with MM estimation method in the third study. In the second study, the regression coefficients estimated from the heteroscedasticity consistent error method were reliable since influential observations were less than 0.5.

Chapter 4 Manuscript 1: Economic sustainability

Title: How partnering for IT-enabled service innovation affects the performance of logistics service providers.

Preface

Logistics, being an important aspect of the supply chain, provide ample opportunities for improving economic sustainability. One of the factors that contribute to economic sustainability is the continuous development of innovative IT-enabled services to improve the overall performance of the supply chain. Previous studies show that innovation offers valuable, rare, inimitable, and differentiated products and, therefore, enhances financial performance and is essential for achieving economic sustainability (Barney, 1991). Focal firms improve their financial performance by reducing costs, improving service levels, and creating added value in the supply chain with competitive logistics services.

However, many logistics firms do not have adequate resources and capabilities to develop and provide innovative IT-enabled services. The inability to provide effective IT-enabled services reduces overall supply chain performance, such as operational efficiencies, customer satisfaction, and overall profitability (Langley & Infosys, 2019).

A supply chain cannot attain economic sustainability until all partners achieve their sustainability individually. If logistics service providers are economically sustainable, they can further invest in developing infrastructure to improve the services they offer. To help LSPs achieve economic sustainability, focal firms can partner with them and share knowledge, skills and physical assets to develop innovative IT-enabled services regularly. There is evidence of a high level of customer satisfaction, improvement in operational efficiencies and overall financial performance of focal firms working with LSPs that provide innovative IT-enabled services regularly (Rajahonka & Bask, 2016).

This chapter addresses the first sub-question that aims to study the effect of partnership with LSPs for IT-enabled innovations and the factors that influence this relationship using event study as an analytical method.

4.1 Introduction

While 93% of logistics customers agree that information technology (IT) capabilities are an important aspect of logistics service providers' (LSPs) expertise, only 55% of customers are satisfied with their LSPs' IT capabilities (Langley & Infosys, 2019). Many LSPs lack the expertise to use IT-enabled logistics service innovations (LSIs) and have found it challenging to develop them (Langley & Infosys, 2019). The first challenge is to develop service innovations that create value for both their customers and themselves (Karia & Wong, 2013; Langley & Infosys, 2019). A related issue is the risk of their services not being accepted by their customers (Yazdanparast, Manuj, & Swartz, 2010). Non-acceptance of services may result in the potential loss of income or financial benefits. A second challenge is that LSPs often struggle to extend the innovations they have developed for one customer to others. The third challenge is the difficulty of acquiring the IT resources they need to develop innovations when they lack these resources internally (Franklin, 2007; Govindan & Chaudhuri, 2016; Rajahonka & Bask, 2016; Wagner & Franklin, 2008). This difficulty means that IT-enabled LSIs are costly and risky, and it is uncertain whether they will achieve their profit targets (Tepic, Kemp, Omta, & Fortuin, 2013; Jorde & Teece, 1990).

Partnerships have been successfully used by LSPs to overcome challenges in introducing LSIs (Busse & Wallenburg, 2011; Flint, Larsson, Gammelgaard, & Mentzer, 2005; Grawe, 2009). Partnerships for LSIs are a fairly recent phenomenon (Bellingkrodt & Wallenburg, 2013; Rajahonka & Bask, 2016; Wagner & Sutter, 2012; Stephen M. Wagner, 2013) and enable LSPs to exchange knowledge, skills and physical resources with their partners to

overcome the challenges they face when developing innovations. Additionally, innovations from partnerships can be a source of competitive advantage (Rajahonka & Bask, 2016). Partnerships for innovation in the manufacturing (e.g. Laursen & Salter, 2006) and software (e.g. Jeppesen & Molin, 2003) industries highlight benefits, including providing access to additional resources (Powell, Koput, & Smith-Doerr, 1996), and the reduction of risks, development time, and costs (Faems, Van Looy, & Debackere, 2005; Knudsen, 2007). Increased interaction among partners during innovation facilitates access to external knowledge and enhances new knowledge generation (Jeppesen & Molin, 2003; Lau, Tang, & Yam, 2010; Un, Cuervo-Cazurra, & Asakawa, 2010), enabling new ways of testing and assessing prototypes, adding new product functions and analysing market trends that may improve the financial success of innovative products (Lau et al., 2010; Zulu-Chisanga, Boso, Adeola, & Oghazi, 2016). New products are highly profitable, generating a greater than 90% return on investment in less than two years and acquiring more than 40% of the market share (Cooper, 2011). These conjectures are supported by evidence; for example, partnering with customers increased LSP innovation (Rajahonka & Bask, 2016); partnerships with IT providers lowered the risk of non-acceptance of their services (Rajahonka & Bask, 2016); and collaborative innovation improved revenue from new logistics services (Wagner, 2013). However, the impact of other factors, such as how firm size influences the performance of partnership for innovation (Busse & Wallenburg, 2011, 2014; Rajahonka & Bask, 2016; Wagner & Sutter, 2012) require further investigation.

There is a positive market value change to inter-firm partnerships in the high-tech (Liu & Ravichandran, 2015; Piachaud & Muresan, 2004), pharmaceutical (Campart & Pfister, 2007), and manufacturing (Noh, 2015) industries, showing financial benefits to the firms and the investor perception of the benefits they bring. In logistics, the outcomes are intangible

activities (such as managing warehouse operations) and, therefore, results from other sectors that emphasize the R&D expenditure needed to develop new products and marketing investments (Campart & Pfister, 2007) may not hold. This paper aims to investigate whether there is a market value change in reaction to the establishment of partnerships for IT-enabled logistics service innovations, and how firm-level and partnership characteristics influence the reaction.

This study is important for several reasons. We theorise and test a comprehensive model based on a multi-country event study to assess whether partnership-based LSIs are financially beneficial for LSPs and provide a rationale to explain the relationship between firm and partnership characteristics and financial performance. While the service-dominant logic (SDL) (Vargo & Lusch, 2004) is instrumental in explaining how the knowledge, skills and physical resources of partners used for logistics value co-production lead to strategic benefits for LSPs, the resource based view of the firm (RBV) (Barney, 1991) explains how the strategic benefits of logistics value co-production results in higher financial performance for LSPs. Our study answers calls (Busse & Wallenburg, 2011, 2014; Rajahonka & Bask, 2016; Wagner, 2013) to use objective data to study the financial benefits of partnerships for IT-enabled LSIs and the effect of firm- and partnership-level characteristics. Previous studies investigated non-partnership-based logistics innovation (Busse & Wallenburg, 2011, 2014; Shi, Arthanari, & Wood, 2017; Shi, Zhang, Arthanari, Liu, & Cheng, 2016; Wallenburg, 2009); or used subjective or perceptual data from surveys (Shi, Arthanari, & Wood, 2016) or case studies (Busse & Wallenburg, 2014; Rajahonka & Bask, 2016).

The rest of the paper is structured as follows. The next section reviews relevant literature on partnerships for LSPs. The third section explains the theoretical concepts of RBV and SDL and develops hypotheses. The fourth section outlines the event study methodology that was

used. Following that, the results of the event-study and the hierarchical regression analysis are presented. Finally, the paper concludes by discussing the results and the study's limitations, and by offering suggestions for future research.

4.2 Literature review

This section discusses how the use of partnerships for innovation can be a useful tool to overcome the barriers LSPs face while developing IT-enabled LSIs, with an emphasis on engaging with different logistics partners to reduce risks and provide resources. We discuss trends in the logistics market and in IT-enabled innovations and then the barriers to innovation. The section concludes by discussing the benefits of partnership for innovations.

The growth in customer demand for logistics services has increased the demand for innovative IT-enabled services (Langley & Infosys, 2019; Manners-Bell, Cullen, & Roberson, 2014). Recent innovations in IT, such as big data, cloud computing, and real-time analytics, are becoming more important for logistics optimisation as these technologies increase end-to-end visibility and offer new capabilities for efficient product movement (Langley & Infosys, 2019). Examples of IT-enabled LSIs include: self-service kiosks for the delivery and pickup of parcels (B2C) and a 24x7 online system for medical equipment to be delivered directly to the point of use (B2B) (da Mota Pedrosa, Blazevic, & Jasmand, 2015). These IT-enabled LSIs have streamlined the flow of physical goods, cash, and information, and facilitated the growth of networked logistics services (Yan, Zhang, Yang, & Ning, 2008). IT-enabled LSIs have improved the efficiency of logistics processes, enhanced the utilisation of resources, and reduced operating costs (Choy et al., 2014).

Besides these operational benefits, LSPs that have developed IT-enabled LSIs attract more customers. However, LSPs face challenges in developing such innovations (Busse & Wallenburg, 2011; Flint et al., 2005). First, customers may resist adopting innovations

because of the uncertainty of the expected benefits (Yazdanparast et al., 2010), especially if the new service offerings are not aligned with their requirements. Second, because most contracts are for a relatively short time period, most LSPs would find it difficult to justify investing in innovations for a particular customer (Franklin, 2007; Govindan & Chaudhuri, 2016; Wagner & Franklin, 2008). The short-term nature of contracts between LSPs and their customers (Busse & Wallenburg, 2014) influences opportunities to develop long-term innovation plans, meaning that innovations are often reactions to customer problems (Wagner & Franklin, 2008). A recent study shows LSPs invest in developing IT resources under revenue sharing contracts due to increased profits (Gong, Kung, & Zeng, 2018). Finally, LSPs lack the knowledge, skills, hardware, and software required for developing new service offerings (Parida, Westerberg, & Frishammar, 2012). When these challenges are combined with the intense competition and low-profit margins in the industry (Min Shi & Wei Yu, 2013; Capgemini & Langley, 2017), the result is little investment in innovation (Capgemini & Langley, 2017), with most LSPs offering only basic logistics services (Busse & Wallenburg, 2011, 2014; Flint et al., 2005; Wagner, 2008; Wallenburg, 2009).

LSPs can address these barriers by partnering with customers, IT providers or other LSPs. Partnerships help LSPs to combine their complementary resources and capabilities, and share development efforts (Walters & Rainbird, 2007), and to respond to customers' service requirements by exchanging ideas and developing customized services that increase acceptance rates (Flint et al., 2005; Rajahonka & Bask, 2016). Customers often want to shift from a transactional relationship to a higher-value relationship with their LSPs (Langley & Infosys, 2019; da Mota Pedrosa et al., 2015; Rajahonka & Bask, 2016; Su, Gammelgaard, & Yang, 2011). Using partnerships helps LSPs improve their relationships with their customers, solve conflicts, and improve their productivity (da Mota Pedrosa et al., 2015), reducing the

barrier of non-acceptance of service offerings (Rajahonka & Bask, 2016). Once an LSP successfully develops and implements a new service for a customer, the LSP can offer it to other customers that require similar services with a modular design allowing rapid reconfiguration for new service configurations (Rajahonka & Bask, 2016) and reducing risk as it has been partially trialled with other customers. Partnerships reduce the risk of innovations not being accepted by customers, make it easier for innovations developed for one customer to be offered to other customers, and enable LSPs to access the IT skills they require. The service differentiation from LSIs can lead LSPs to increase revenue and provide a competitive advantage in the logistics market (Barney, 1991; Lusch & Nambisan, 2015). Partnership with IT providers supports LSPs to overcome the barrier of lack of knowledge, skills and IT resources as there is a shift of part of the innovation activities from logistics firms to the IT providers. As IT-enabled service innovations are resource intensive projects (Sauvage, 2003), partnering with IT providers enables LSPs to offer more services without having to invest in developing in-house IT capabilities (Glaister & Buckley, 1996).

4.3 Theory and hypothesis development

This section explains partnership for innovation, links it with the service-dominant logic (S-D logic) to derive strategic benefits and competitive advantage. We then use the RBV to link competitive advantage, with the financial performance measured as a market value change. Finally, we develop and present the hypotheses that relate the market value change to the type of partnership, firm size, partnership experience, level of IT, related experience, and the growth potential of LSIs.

4.3.1 The relationship between partnership for innovation and S-D logic

Firms partner with other independent organisations to acquire knowledge, skills, and capabilities for innovation. As all the resources, expertise and skills to innovate and compete in the logistics market are difficult to develop internally. Partnership is defined as a strategic

relationship between two independent firms to achieve mutual benefits by sharing specialised skills, knowledge and resources they lack (Mohr & Spekman, 1994). The ability of partners to leverage information and knowledge across each other is critical for the success of the partnership. For example, United Postal Service (UPS), an LSP and Optoro, an IT company, recently formed a partnership to offer an innovative service to retailers and manufacturers to optimise transportation and value addition to the returns and excess inventory (UPS, 2016). In this case, UPS brings wide and rich operational and logistics expertise to the partnership, while Optoro's software platform maximises recovery value and reduces environmental waste (UPS, 2016). Using complementary resources, skills, and capabilities both UPS and Optoro co-produced value that enhanced the firms' ability to respond to the end customers' needs with the new IT-enabled service. In this example, the partnership enabled the co-production of value: both firms coordinated, developed and validated a new service by sharing the knowledge and skills required to integrate the technologies and other resources for innovation (Lusch & Vargo, 2011).

Value co-production is a core tenet of S-D logic, an organizational concept where partners are actively involved in designing, defining and developing innovations. In contrast, value *co-creation* occurs when multiple partners contribute to benefit each other without being aware of the other partners; for example, providing feedback to the manufacturer after using a washing machine enabling improvements to be made in the future is a value co-creation process (Vargo & Lusch, 2016).

Traditional goods-dominant logic (G-D logic) argues that providers of goods and/or services are the sole creator of value and that value is embedded in output (Vargo & Lusch, 2016). Thus, from the G-D logic perspective, buying groceries from a supermarket is an example of "value in exchange" because customers make a payment to procure goods. No

consideration is given to the role of partners. G-D logic separates the role of partners from the value production process while S-D logic focuses on the dialogues between manufacturers, service providers, customers and other partners who jointly produce value through partnerships. Partners apply specialised competencies (knowledge and skills) and other resources in the value co-production process to benefit themselves and other partners.

S-D logic is relevant for this study because it examines how partners cooperate directly to create IT-enabled innovations. The sharing of knowledge, skills and expertise is the paramount aspect of value co-production where knowledge synthesis plays a critical role in innovation development. For example, Figure 5 gives a sample announcement of partnership for IT-enabled innovation between DHL, an LSP and Fujitsu, an IT company used in this study, explaining how both partners will use IT for innovation development.



Fujitsu Collaborates with DHL to Disrupt the Logistics Market with Innovative Technology

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* Partnership based on co-creation, pooling knowledge and resources to deliver innovative solutions

* Industry-changing managed procurement service to include breakthrough wearable solutions, improving safety and efficiency for users across multiple industries

London — Fujitsu today announced a strategic co-creation partnership with DHL Supply Chain UK to develop new services based on wearable technology and the Internet of Things (IoT).

Building on its successful managed procurement services collaboration with DHL, which provides a new business approach to procurement solutions including uniform and protective equipment, Fujitsu will share its industry and technology expertise to jointly develop innovative solutions that improve safety for emergency services, whilst delivering operational efficiencies. Fujitsu and DHL also plan to use the partnership to drive the creation of entirely new markets in other sectors, such as airline logistics.

In a first for the logistics industry, the DHL solution provides a personalized supply chain for emergency and other uniformed services, supported by Fujitsu's ecommerce platform. This innovative concept reduces the cost of product and supply chain management, while facilitating innovation and delivering a user friendly, personalized experience for individuals.

The use of wearable and IoT technology such as Fujitsu UBIQUITOUSWARE will enable emergency services to track the well-being of individuals in the field, through a dashboard showing their status and location. This will help to ensure accurate and timely response in safety-critical or life-threatening situations, as well as providing real-time tracking for the location of vital protective equipment.

Paul Richardson, MD, Specialist Services, DHL Supply Chain UKI, said:

"As the global logistics leader, we constantly seek out innovations that improve our customers' lives.

Wearable technology is going to transform the way we work, helping us understand the dynamics of what's happening around us and providing real time insight on our environment as never before. I'm delighted to partner with Fujitsu in this area and am confident that, together, we can deliver a gamechanger in the market."

Francois Fleutiaux, SVP, Head of Sales and Country Leadership EMEA, Fujitsu, said:

"At Fujitsu, our aim is to create meaningful, transformative innovation, which is precisely what we anticipate that this partnership with DHL will deliver. By combining industry expertise from DHL with our own insight, we can realize the incredible potential of new technologies in logistics, such as brand new functionalities, a step change in user experience and additional cost savings for organizations. In the age of digital disruption, the Fujitsu-DHL partnership underlines the value of pooling knowledge and ideas through co-creation to innovate and prosper." Notes to editors

In a separate project, Fujitsu is already delivering benefits to DHL customers through the deployment of GlobeRanger IoT scanning and sensor technologies for airline duty-free logistics. Following a successful proof of concept, this project is forecast to deliver annual labor savings of more than EUR 500,000 and a 59 percent return on investment for the organization.

For more on DHL Supply Chain UK please visit their website at www.dhl.co.uk.

Figure 5: A sample announcement used in this study

The above announcement highlights that both partners intend to share knowledge, skills and other expertise to co-produce a new service to benefit each other and the end users. Recent studies also claim that sharing knowledge with partners is a key success factor for logistics innovation (Rollins, Mehtälä, & Pekkarinen, 2011). Lin et al. (2015) applied the S-D logic framework to study the logistics-manufacturing interface and found that sharing knowledge, skills, and expertise among logistics service providers and manufacturers improved coordination and management at the design, process and information interfaces

between the two partners. Hence, partnerships and value co-production reinforce each other, mediated by knowledge exchange to address the lack of resources required for innovation.

S-D logic’s conceptualisation of value co-creation is supported by ten foundational premises (FPs) derived from five axioms (Vargo & Lusch, 2016). These theoretical premises establish the S-D logic framework and explain how knowledge, skills and expertise are exchanged to create value to benefit the exchange partners jointly.

S-D logic’s conceptualisation of value co-creation is supported by ten foundational premises (FPs) derived from five axioms (Vargo & Lusch, 2016a). These theoretical premises establish the S-D logic framework and explain how knowledge, skills and expertise are exchanged to create value to benefit the exchange partners jointly. Table 3 discusses the FPs and their relevance to logistics innovation.

Table 3. SDL axioms and foundational premises (FPs) and its relationship with LSPs (Vargo & Lusch, 2016).

Axiom/FP	Relationship with LSPs
Axiom 1/FP 1 Service is the fundamental basis of exchange.	LSPs apply knowledge, skills and expertise to design and operate the service aligned with the customer’s requirements.
FP 2 Indirect exchange masks the fundamental basis of exchange.	An exchange of money for tangible resources required to perform a logistics operation masks the fundamental basis of exchange. For example, payment to an LSP, who was assigned to complete the transportation of goods from point A to B is generally viewed as the fulfilment of the tasks using combination of resources such as trucks, drivers and the routes, not the application of knowledge, skills and expertise that made that particular logistics operation possible.
FP 3 Goods are the distribution mechanism for service provision.	Logistics customers want service, for example, on-time delivery of the goods. In this case, goods are the distribution mechanism to have them on time at the pre-agreed location.

<p>FP 4 Operant resources are the fundamental source of strategic benefit.</p>	<p>Knowledge, skills and expertise transform tangible resources into a strategic benefit. For example, LSPs use their specialist logistics knowledge and skills to develop a goods distribution mechanism better than its competitors.</p>
<p>FP 5 All economies are service economies</p>	<p>The economic value in logistics depends on the LSP's ability to create value propositions acceptable to its customers.</p>
<p>Axiom 2/FP 6 Value is co-created by multiple actors, always including the beneficiary</p>	<p>The value co-creation in logistics starts with customers define requirements, LSPs develop a value proposition, customers' judge and accept them. All exchange partners represent the knowledge source, contribute to value co-creation.</p>
<p>FP7 Actors cannot deliver value but can participate in the creation and offering of value propositions.</p>	<p>The exchange occurs when customers, LSPs and IT providers make and accept value propositions. LSPs and IT providers exchange for the money and knowledge. Customers exchange for the value propositions. New value propositions are referred to as innovations (Skálén, Gummerus, Koskull, & Magnusson, 2015).</p>
<p>FP 8 A service-centred view is inherently customer oriented and relational.</p>	<p>LSPs respond to customers' requirements by providing value propositions to them, make value proposition by exchanging knowledge and resources with them and other partners resulting in co-creation of value for all exchange partners.</p>
<p>Axiom 3/FP 9 All social and economic actors are resource integrators.</p>	<p>Customers, LSPs and IT providers and other exchange partners involve themselves and integrate resources for value co-creation.</p>
<p>Axiom 4/FP 10 Value is always quickly and phenomenologically determined by the beneficiary.</p>	<p>Value is experiential and reciprocal, and the exchange partners determine it. Since, LSPs, customers and IT providers are involved in the making and accepting value propositions so, they all are providers and beneficiaries.</p>
<p>Axiom 5/FP 11 Value co-creation is coordinated through actor-generated institutions and institutional arrangements.</p>	<p>Institutions refer to the rules, norms and beliefs that promote or restrict actions (Scott, 2008). Well-Defined rules, norms and beliefs help LSPs, customers, IT providers and other exchange partners achieve a higher level of exchange and value creations</p>

Source: Adapted from (Vargo & Lusch, 2016).

Only resources that are more effective for developing innovations can provide strategic benefits to the LSPs (Lusch & Vargo, 2014). S-D logic differentiates between operand and operant resources based on their nature (Vargo & Lusch, 2016). In the S-D logic framework, operant resources (e.g., knowledge, skills and expertise) are intangible and dynamic, and act on operand resources that are tangible and static (e.g., material, equipment, technology, information, and finances) to make new value propositions, known as innovations in logistics context (FP7) (Lusch & Nambisan, 2015).

Principally, S-D logic recognises the role of operant resources as higher order resources that would allow a LSP and its partners to identify and develop a novel use of operand resources for IT-enabled innovations. Continuing with the DHL-Fujitsu innovation example, DHL and Fujitsu integrated their knowledge and expertise to find a novel way of using their logistics and IT infrastructure to make a new value proposition for their customers. Partnering for innovations enables LSPs to integrate their operant resources with partners that allow them to find novel uses for operand resources jointly. This joint innovation development practice overcomes the resource shortage that LSPs face when developing IT-enabled innovations and also provides strategic benefits (FP4) because they can provide differentiated service offerings to their customers.

4.3.2 The relationship between competitive advantage and financial performance

The competitive advantage of LSPs can be viewed as an ability, achieved from its attributes and resources to perform logistics functions better than competitors to attain a superior position in the market. (Lambourdière, Rebolledo, & Corbin, 2017; Wong & Karia, 2010). Past studies propose cost leadership or differentiation as two approaches to achieve competitive advantage (Newbert, 2008; Porter, 1985). In support, Day (1984) argues that competitive advantage is the positional superiority, achieved through differentiation, cost

leadership or improving operations. In the light of these arguments, competitive advantage is often viewed from a focal firm's perspective without considering how the implementation of a strategy giving a superior position to the focal firm may affect the market position of partner firms. In contrast, strategic benefits are the advantages partners gain over competitors in the respective marketplaces (Jap, 2001). Hence, it is not possible to gain strategic benefits without partnership.

Partnership for innovation provides strategic benefits to all partners due to development of partnership capability that is firm's ability to leverage other partner's operand and operand resources. To understand this, continuing with DHL-Fujitsu innovation example, DHL's provision of strategic benefit to Fujitsu is providing access to the logistics market for service development that may allow Fujitsu to strengthen its presence in the marketplace relative to similar IT-providers that do not have knowledge or skills for logistics service development, thereby gaining a competitive advantage. This may allow Fujitsu to use experience of developing IT-enabled services with one logistics partner to another logistics firms. In the extended reciprocity, Fujitsu contributes IT knowledge and skills to develop innovative Internet of Things enabled logistics service with DHL that enable its customers to improve their operational performances. Thus, DHL's new service offerings may become attractive to the end customers. This relates to providing basic and differentiated service offerings. DHL may continue to effectively provide differentiated service offerings resulted from partnership capability to the customers, improves its value propositions relative to competitors thereby gaining a competitive advantage. In support, prior studies suggest that firms who use partnership capability to develop a combination of innovation and marketing strategies to remain competitive, improve their financial performance (Mizik & Jacobson, 2003; Teece, 1986). The study done by Mizik and Jacobson (2003) shows positive market

value change to the competitive advantage achieved through balancing advertising costs and R&D expenditure. Hence, in an S-D logic context, competitive advantage is defined as the strategic benefits partners gain over competitors that enable partners to compete effectively in the respective marketplaces to generate value for themselves and the shareholders.

In summary, in logistics innovation, LSPs and partners combine their respective logistics, marketing, and technological knowledge and expertise for value co-production process. In doing so, LSPs mitigate the risks and limitations of resources and create new value propositions to take the emerging opportunities in the logistics market. In other words, LSPs' response to customers' requirements with innovative service offerings developed in partnership may increase sales, profits and value for the shareholders. Therefore, we hypothesise that:

H1: Partnership for innovations will increase the market value of LSPs.

4.3.3 Value co-production with IT

Partnership for IT-enabled innovations are relationship driven (FP8) (Yazdanparast et al., 2010). From an S-D logic perspective, these innovations are the result of relationship congruence between two partners to understand each other's processes, procedures, and internal and external environmental factors through dialogues and interactions resulting in value co-production aligned with customers' needs and requirements. A recent study has found that alignment of business objectives, customer commitment, and partnership with suppliers positively influences supplier commitment which in turn improves innovation performance (Patrucco, Moretto, Luzzini, & Glas, 2020). Continuing with our DHL-Fujitsu innovation example, both partners co-produced value in terms of improved safety and increased operational efficiencies which can be derived from using the service. The

application of IT improved logistics service performance, service quality, and competitive advantage (Lin, 2009; Lin et al., 2015). The exchange of real-time data in the distribution process lead to better capacity management and has improved process in the supply chain (Herrmann, Rogers, Gebhard, & Hartmann, 2015). IT has a positive effect on the pursuit of the standardisation of services (Busse & Wallenburg, 2014). The success of IT-enabled service with one customer may open another opportunity for the LSPs to extend standardised service offerings to a larger customer base. Therefore, IT-enabled service, developed in partnership and conveying the embedded knowledge of partners, is likely to impact financial performance due to improved service performance and customer loyalty (Stank, Goldsby, Vickery, & Savitskie, 2003; Wallenburg & Lukassen, 2011). Indicators such as how quickly the service was developed relative to competitors, the amount of revenue generated, and the extent of service performance improvements after the implementation of IT-enabled innovations from different industries can also be used to support investments, since investors base their return estimates upon the actual experience of firms with similar characteristics (Hendricks & Singhal, 2001). It is then hypothesised that the stock market may react more positively to partnership for IT-enabled innovations compared to partnership for non-IT-enabled innovations.

H2a: Partnership for IT-enabled innovations will have a greater increase in the market value of LSPs.

On the other hand, logistics firms that possess the required human resources (i.e., knowledge and skills), physical resources (i.e., vehicles, tools, and equipment), and IT (i.e., hardware, software, and network technologies) to develop new IT-enabled service offerings may perform logistics functions better than other LSPs without forming partnership (Lambourdière, Rebolledo, & Corbin, 2017; Oke, 2007; Wong & Karia, 2010). When LSPs rely

on their attributes and resources (valuable, rare, inimitable, and non-substitutable) for the development of new IT-enabled services, they may strengthen their relationship with customers as the customers need the specific LSPs to maintain the smooth functioning of the supply chain and therefore build a dependency on the LSP (Fulconis, Nollet, & Paché, 2016). In this case, LSPs can charge better prices for providing new IT-enabled services resulting in higher profits. Logistics firms that have developed resources and capabilities internally can claim value appropriation from the total net value (i.e. total output minus total input) created by developing new services (Wagner, Eggert, & Lindemann, 2010). Value appropriation means larger portion of value the logistics firms can take from controlling valuable resources (Wagner, Eggert, & Lindemann, 2010). This will allow the firm to increase customer dependence and leverage its bargaining power to extract financial advantage and influence the terms of trade (Ellegaard, Medlin, & Geersbro, 2014; Wagner et al., 2010). Furthermore, logistics firms might also save on coordination and transaction costs leading to improved profitability (Williamson, 1985). It is then hypothesised that the stock market may react more positively to no-partnership for IT-enabled innovations compared to partnership for IT-enabled innovations.

H2b: No-partnership for IT-enabled innovations will have a greater increase in the market value of LSPs compared with partnership for IT-enabled innovations.

The competing hypotheses developed above regarding the likelihood of an LSP to develop new IT-enabled services. These hypotheses predict that internally developed resources or external resources obtained from partnership could explain the financially advantageous usage of IT in the service development.

4.3.4 Firm size of LSPs

Small LSPs differ from large LSPs in several ways. Compared with small LSPs, large LSPs have access to high levels of operant resources (i.e., internal knowledge base to undertake innovation) as well as operand resources (i.e., including tools, equipment, and vehicles), due to their strong resource base, and innovations may result with reduced risk and produce higher firm value (Lusch & Vargo, 2014). Additionally, large LSPs have formalised their innovation development, resulting in the reduced autonomy of development teams, leading to a reduction in innovation projects (Busse & Wallenburg, 2014). In contrast, small LSPs have low levels of technology investments, less skilled staff and reduced IT expenditure for innovation development (Busse & Wallenburg, 2014). Partnership may enable small LSPs to overcome these resource limitations by sharing complementary resources, identifying market opportunities, and identifying new technologies which may have a positive impact on innovation success (Wallenburg, 2009). Additionally, small LSPs undertake innovations faster, due to their high-risk appetite to gain market share quickly to attain competitive advantage and improve profitability (Boso et al., 2016).

Prior studies have demonstrated that financial performance depends on the firm's ability to manage and apply its operant resources (FP4) (Madhavaram & Hunt, 2008). Therefore, small LSPs might benefit more from partnership for IT-enabled innovation, predicting more positive change in the market value. Hence, it is hypothesised:

H3: Partnership for IT-enabled innovation will have a greater increase in the market value of smaller LSPs.

4.3.5 Growth potential of partnership for innovation

Growth potential is based on FP4; during partnership for innovation, partners' operant resources are required to foster the development of new service (Blazevic & Lievens, 2008; Lusch & Vargo, 2014). Partnership for innovation improves LSPs' alignment between the

service and the customer requirements (Yazdanparast et al., 2010), thereby increasing the likelihood of acceptance of the service and success in the marketplace (Lusch, Vargo, & O'Brien, 2007). Partnership for innovation may also reduce the development time, and facilitate rapid implementation, increase successful service offerings, and contribute to growth. The growth potential of a firm influences market reaction (Bose & Pal, 2012; Hendricks & Singhal, 2003, 2009) and we argue that LSPs with higher growth potential are more likely to implement new IT-enabled service development projects and investors may have high expectations from these LSPs. Investors may view partnership for IT-enabled service innovations more positively than their counterparts not developing IT-enabled new service offerings. Hence, we hypothesise:

H4: Partnership for IT-enabled innovation will have a greater increase in the market value of LSPs with high growth potential of LSPs.

4.3.6 Type of partners for logistics innovation

As “[a]ll social and economic actors are resource integrators” (Vargo & Lusch, 2008, p. 7), partnership with business actors is a potential source of operant resources for service innovations. However, depending on their resources, different types of partners (IT providers, customers, other logistics providers) bring different benefits to LSPs. If LSPs partner with their customers, LSPs are likely to benefit because aligning with their customers’ requirements usually leads to the acceptance and successful adoption of innovations, followed by improved financial performance (Cahill, 2006; Wagner & Sutter, 2012; Yang, Marlow, & Lu, 2009). However, in most cases, once an IT-enabled service with a customer has been developed, it is unlikely to increase a LSP’s revenue further unless the LSP extends the service to other customers (Flint et al., 2005; Wagner, 2013).

Partnering with IT providers may be less beneficial to LSPs. Resource constraints may induce LSPs to partner with their IT providers to fulfil their customers' requirements. LSPs may also develop new solutions without partnering with customers to expand their service offerings, anticipating customers' future requirements. However, the risk of innovations being not accepted by their customers is still present. Instead of being proactive and developing innovative services with IT providers, collecting information about customers' requirements and how they are changing is valuable for developing acceptable innovations (Flint, Larsson, & Gammelgaard, 2008).

Partnering with other logistics providers may provide access to new markets and a chance to access complementary resources, resulting in increased sales, improved operational efficiency and financial performance (Crujssen, Dullaert, & Fleuren, 2007). For example, a partnership between an asset-light LSP and an asset-heavy LSP in a different country allows the asset-light LSP to expand its services to the already developed market of the asset-heavy LSP. This provides the asset-light LSP with an opportunity to increase revenue higher than an LSP that partners with the customers for IT-enabled service innovation. It is predicted that innovations in partnership with IT providers, customers and other logistics providers may result in varying degree of changes in market value. These arguments leads to the following hypotheses:

H5a. Partnerships for IT-enabled innovations will have a positive increase in the market value of LSPs when they partner with customers.

H5b. Partnerships for IT-enabled innovations will have the lowest increase in the market value of LSPs when they partner with customers compared with partnerships with IT providers.

H5c. Partnerships for IT-enabled innovations will have a greater increase in the market value of LSPs when they partner with other LSPs compared with partnerships with customers.

H5d. Partnerships for IT-enabled innovations will have the greatest increase in the market value of LSPs when they partner with other LSPs compared with partnerships with IT providers.

4.3.7 Partnership experience

Partnership experience draws on S-D logic, where FP1 and FP3 imply that the partners are resource integrators in the innovation development. The partners integrate their set of resources and competences into innovation development (Wilson, Zeithaml, Bitner, & Gremler, 2012). Customers play an important role in innovation development, as development of new service offerings depends on the collection and use of customers' knowledge and skills. Additionally, the capacity of a firm to generate knowledge is limited by its previous experience as managers learn new concepts by connecting it with what they already know (Cohen & Levinthal, 1990). Moreover, FP6 implies that with increasing partnership experience, LSPs have more opportunities to combine new knowledge internally and with other partners, increasing knowledge absorption and transforming new service offerings into improved financial performance (Bouncken & Fredrich, 2016; Bouncken, Lehmann, & Fellnhofner, 2016; Kalaiganam, Shankar, & Varadarajan, 2007). The partnership experience can be successfully linked to the increased number of new service offerings with LSPs' ability to maintain competitive positioning that can result in improved financial performance (Kalaiganam et al., 2007).

Partnership experience may be more beneficial for an LSP when the firm develops multiple IT-enabled innovations with the same partner in a long-term relationship. This is because customers realise relational benefits such as value-added services, increased

communication to help smooth functioning of logistics and supply chain operations and economic benefits with a partner in a long term relationship (Li, Ford, Zhai, & Xu, 2012). Li et al. (2012) have shown that relational benefits influence relational outcomes (such as sales volume, market position, and smooth supply chain process) mediated by trust and commitment that results in long-term relationships. Ganeshan (1994) demonstrated that the greater the relational benefits, the greater the likelihood that the relationship will be successful increasing the willingness to develop multiple innovations with the same partner. Therefore, we hypothesised:

H6a: Partnership for IT-enabled innovation will increase the market value of LSPs with high partnership experience of innovation development.

H6b: Partnership for IT-enabled innovation will increase the market value of LSPs when they develop more innovations with the same partner.

4.4 Methodology

The event study method was applied to analyse how announcements affect the market value. The method has previously been used to estimate the aggregate impact of investors' response to the specific type of event and examine the impact of partnership events such as alliances (Das, Sen, & Sengupta, 1998) or acquisitions (Wilcox, Chang, & Grover, 2001). According to the efficient market hypothesis, a stock market absorbs publicly available information quickly and reflects the effect by an increase, decrease or no change in the stock prices. The investors' response to the announcements when they became public, known as event day, may be different (i.e., observed normal returns) to what would have happened in the absence of such events (i.e., estimated normal returns) (Brown & Warner, 1985). The difference in the observed and the estimated normal returns is known as abnormal returns that reflect an unbiased estimate of the impact of the event.

4.4.1 Sample

We collected two separate samples for this study consisting of announcements with and without partnership for logistics innovations. The announcements are made when LSPs partner with customers, IT-providers, or other LSPs to develop new services, extend existing services, or expand services into new markets or they develop the IT-enabled innovations without partnerships. We followed the standard event study method (Jacobs & Singhal, 2014). First, generation of the sample started with identifying preliminary keywords from reading relevant announcements and articles before a more comprehensive search was conducted. From the results, the terminology used in the announcements was used, and other scholars were consulted to generate a final search string (Jacobs & Singhal, 2014). We used the final search string in Table 5 to search the *Dow Jones Newswires*, *Press Release wires*, *Reuters Newswires*, and *Wall Street Journals* (all sources) in the category of technology and logistics/transportation between 2007-01-01 and 2017-12-31 and identified 52,133 announcements. This project began in 2017 and the span of eleven years was chosen to obtain over a hundred announcements necessary to demonstrate statistical significance of the results (Mackinlay, 1997). We identified the earliest announcement and only included this in the sample. We excluded announcements where there was insufficient data available (e.g., non-publicly listed firms or those without sufficient stock returns data) and had 245 announcements in the sample. An announcement must conform to the following conditions.

1. announcements from publicly listed LSPs should note an agreement with customers, IT providers, or other LSPs for partnership using cooperation or collaboration or strategic alliance or acquisitions or joint venture as mechanism to develop, provide extend, or expand new services to cater end customers specific logistics requirements that involve the commitment of providing the service(s) over an extended period.
2. In the case of non-listed LSPs partnering for innovation, the announcement should include listed customers, IT providers or other LSPs.
3. The announcements should specifically use 'new' and 'partnership' for development, extension or expansion of logistics services.

The following Table 4 shows the breakdown of each step resulting in the sample size for analysis.

Table 4. Breakdown of announcements collected

Criteria	Number
Number of announcements matching keywords with near15	52133
Number of relevant announcements	245
Number of announcements confounded by other news	124
Number of announcements selected for analysis	121

Table 5. List of keywords used in the search for partnership for innovations announcements. The Near15 operator ensures that a term from the first block of keywords occurs nearby to a term from the second block, suggesting that the two words are closely related

(logistics service providers OR LSPs OR contract logistics OR lead logistics providers OR LLPs OR 4PLs OR third party logistics providers OR 3PLs OR third party OR transport OR transport* providers OR transport* OR warehouse operators OR freight OR freight forwarders OR freight shipp* OR freight specialist* OR custom clearing service providers OR logistics OR logistics consultancy OR logistics controlling OR express delivery service provider OR just in time delivery provider OR reverse logistics operators OR supply chain integrat* OR coordinator OR orchestrator OR health care logistics providers OR green logistics provider OR financial service providers OR shipper* OR carrier* OR broker* OR package delivery OR fright service OR cargo OR supply chain OR deliver* OR fleet manage*)

Near15

(collabor* OR coordinat* OR cooperat* OR partner* OR align* OR alliance* OR "work* together" OR teamwork OR "team effort" OR joint* OR joint venture OR participation OR coalition OR interrelation* OR "tie in" OR tie-up OR mutual* OR associat* OR cocreat* OR co-innovation OR combin* OR mutual* OR association* OR interact* OR agreement OR integrat* OR relation* OR shared process* OR acquisition*)

We then identified event date, the name of LSP and its partner for each announcement, identified the international securities identification numbers (ISIN), the headquarters and the stock exchange location. If the LSP was not listed, we used the partner. If both partners were not listed, the announcement was excluded.

Next, we searched for confounding events for the publicly listed LSPs or their partners identified in the previous process. For each event, we searched a three-day window based on the event date (-1, 0, +1) on the Factiva database to identify any other news that investors may react to (McWilliams & Siegel, 1997) at the same time, such as corporate earnings announcements, as they can influence market value changes. We removed 124 observations leaving 121 in the sample.

The final sample with partnerships shows 41 LSPs from 16 different countries Table 6. We found that DHL and Kuehne + Nagel are most active in forming partnerships for innovations. In the USA, 17 firms announced new services in partnerships. LSPs from 10 different countries announced less than five partnerships for innovations. LSPs have developed multiple partnerships with different partners. Only one LSP was found to have developed multiple innovations with the same partner. This study has only differentiated between multiple innovations with the same partner and different partners. Similarly, the final sample of IT-enabled innovations without partnership consists of 33 announcements.

Table 6: Distribution of final announcements

Country	Firms	Local Index	Announcements	% of sample
Netherlands	PostNL	AEX_INDEX	1	0.83%
Germany	Deutsche Post (DHL)	DAX30_Germany	26	21.49%
Denmark	Maersk	MSCI_DENMARK	1	0.83%
United Kingdom	Clipper Logistics PLC	FTSE_ALL_UK	4	3.31%
Malaysia	Pos Malaysia Bhd	FTSE_MALAYSIA	1	0.83%
United Arab Emirates	Aramex	FTSE_NASDAQ_DUB AI	1	0.83%
Hong Kong	Kerry Logistics	HENG SENG_INDEX	6	4.96%
Spain	Banco Santander	IBX35_SPAIN	1	0.83%
Canada	Vitrans Corporation Inc., Titanium Transportation, Kinaxis, Parcel Pal Tech.	MSCI_CANADA_INDEX	6	4.96%
Japan	NYK (Yusen Logistics), Mitsui & Co Ltd., Yamato Group, Kintetsu World Express, Japan Post Holdings Co. Ltd. UPS, Con-Way, FedEx, Knight-Swift	NIKKEI225_JAPAN	5	4.13%
USA	Transportation, Echo Global Logistics, Manhattan Associates, Global Partners, SPS Commerce, Dorian LPG Ltd., Unisys Corporation, Radiant Logistics, Accenture, Sino-Global Shipping, Cubic Transportation systems, C.H. Robinson, Covenant Transportation, LogistiCare	S&P 500	41	33.88%
Saudi Arabia	Bahri	S&P_SAUDI ARABIA	1	0.83%
France	I.D. Logistics, LS Distribution, Bollere Logistics	SBF_120_FRANCE	3	2.48%
Singapore	Singapore Post	SINGAPORE_INDEX	3	2.48%
Switzerland	Kuehne + Nagel	SWISS_INDEX	20	16.53%
Taiwan	Evergreen Marine Corp. (Taiwan) Ltd.	TAIEX_TAIWAN	1	0.83%

4.4.2 Time windows

The abnormal return is calculated over a short event window as this maximizes the ability to connect the event to the change in market value (McWilliams & Siegel, 1997). We used an estimation period of 250 trading days (-261 to -11), with a ten-day isolation period, as has been used in similar multi-country event-studies on partnership mechanisms (Park, 2004), to shield the expected returns from the effects of the announcement and take into account the non-stationarity of the estimates (Jacobs, Singhal, & Subramanian, 2010).

4.5 Variable construction and definitions

We calculated the abnormal returns as the dependent variable for our analysis. We used a range of control and independent variables for the subsequent analysis.

4.5.1 Computation of abnormal returns

We used the market model to calculate the abnormal returns, showing the market value changes, expected on day t , as:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \quad (1)$$

where R_{it} is the expected return of stock i on day t , R_{mt} is the stock market m return on the day t , α_i is the intercept of the relationship for stock i , and β_i is the slope of the relationship for a stock i with respect to the market return. The term $\beta_i R_{mt}$ is the portion of the rate of return on a market portfolio to stock. The error term ε_{it} for stock i on day t is the portion of the return that cannot be explained by market movements and therefore captures the change in market value related to the event. α_i and β_i were estimated using Ordinary Least Squares (OLS) regression over 250-days (-261, -11) (Jacobs et al., 2010; Park, 2004).

We used local market indexes, as the approach is effective in detecting abnormal returns in multi-country event-studies (Campbell, Cowan, & Salotti, 2010). Abnormal returns were aggregated across firms to calculate mean abnormal returns.

The mean abnormal returns for all firms at day t was calculated as follows:

$$\overline{AR}_t = \frac{1}{N} \sum_{i=1}^N AR_{it} , \quad (2)$$

where N is the number of firms in the sample. The cumulative abnormal returns (CARs) was calculated by summing up the mean abnormal returns in the event window (-1, 1) as follows:

$$CAR(-1, 1) = \sum_{i=-1}^1 \overline{AR}_t , \quad (3)$$

4.5.2 How IT was used in service development

We examined each announcement considering two factors to determine whether IT was used for innovation. First, we looked for the two-digit SIC code of both the firms in the sample. Firms with SIC from 40 to 47 were categorized as 'LSPs' (Lampe & Hofmann, 2014). Firms with SIC codes starting with 73 or 48, were categorised as 'IT providers' while all others were coded as 'customers' (Visnjic, Neely, & Jovanovic, 2018; Wilcox et al., 2001). In the case of LSPs partnering with customers, we looked for keywords in the announcements (Chow, Choy, Lee, & Chan, 2007; Choy et al., 2014; Lamba & Singh, 2016; Lanko, Vatin, & Kaklauskas, 2018; Lin, 2009), such as, WMS, MMS, temperature monitoring, track and trace, automated billing, or services, online, visibility, internet, e-fulfilment, click and collect, software, or other form of non-asset. We considered IT to be used for innovation even when the partnership was with a customer. We categorized 89 announcements as using IT for innovations development.

4.6 Dependent variable

Cumulative abnormal returns (CARs) resulting from the sub-sample analysis of only partnership events were used as the dependent variable. Sub-sample analyses were performed for a few reasons. First, they were used to compare the benefits of using partnerships for developing IT-enabled logistics services with those that do not use

partnerships. Second, if using a partnership is beneficial, then the sub-sample analysis was used to find out which firm-level factors may have effect the firm's abnormal returns. Using a dummy variable in a complete sample of regression analysis can only demonstrate whether using partnership influence CARs. However, it will not show the impact of firm-level factors on abnormal returns that result from developing IT-enabled logistics services in partnership. The objective of this research was to estimate the impact of using partnerships on CARs and what firm-level factors increase/decrease CARs if a firm decides to enter into partnerships for developing IT-enabled logistics services.

4.7 Independent variables

We used five independent variables to address the hypotheses.

Firm size was assessed by revenue of the firm as reported in the most recent fiscal year prior to the year of announcements and used a log-transformation to normalize it (Hendricks & Singhal, 2003). The predicted coefficient for Firm_Size is negative.

Growth potential (Gr_Pot) was measured using the ratio of book value to market value (Fama & French, 1992). The market value is the stock price multiplied by number of outstanding shares at ten days prior to the announcement; the book value is the asset value obtained for the most recent fiscal year prior to the announcement date (Hendricks & Singhal, 2003). We predict a positive coefficient for Gr_Pot.

Partnership with customers (Col_CU) was a dummy variable to represent partnership with customers in the regression model. Col_CU is coded 1 if LSPs initiate partnerships with customers, 0 otherwise. A positive coefficient is predicted for Col_CU.

Partner experience (Part_Exp), measured by counting the number of IT-enabled partnerships for innovation five years prior to the first date of announcement including the

announcements excluded from the initial sample due to confounding events (Anand & Khanna, 2000). We predict a positive coefficient for Part_Exp.

Alliance partner (Alli_Part) implies the same partner for multiple IT-enabled innovations development. For this purpose, a dummy variable is used and coded 1, if a particular LSP has developed multiple innovations with the same partner, 0 otherwise. We predict a positive coefficient for Alli_Part.

4.8 Control variables

We controlled for three variables. First, we controlled for firm age, calculated as the time elapsed from the date of founding the firm and the time of the announcement (Kalaigianam et al., 2007). As the learning process is crucial for innovation and firm performance (Calantone, Cavusgil, & Zhao, 2002), older firms have gained experience and routinized their innovation process.

Second, we controlled for multiple announcements from the same firms, as we identified several firms were highly active. The variable *Multiple* controls potential differences in the investors' reaction to the multiple partnership announcements by the same firms. A dummy variable was coded as 1 if the firm has multiple announcements, for example, 2, 3 or 4 innovations with different partners.

Third, we controlled for international partnerships for innovations. Firms with international exposure perform better in innovation (Fosfuri & Tribo, 2008). We distinguished between international and domestic partnerships for innovations based on firm headquarter location, partnerships are classified as international if the headquarters of the partners are not in the same country. A dummy variable was coded as 1, for international partnerships, 0 otherwise.

4.8.1 Descriptive statistics

Table 7 presents descriptive statistics of independent and control variables used in the regression. 85 out of 89 observations including only IT-enabled innovations were used in the regression analysis; four observations were dropped due to lack of data. DataStream was used for book-to-market ratio and revenue; Factiva for partnership experience; and, firms' websites and annual reports for firm age.

The minimum and maximum revenue is 7.31 and 124623.30 million US\$ respectively (we use the natural logarithm in analysis). The median book-to-market ratio is 0.36, and the minimum value is 0.0046. The average age of the firms is 54.57 years. The youngest firm is 6 years old and the oldest firm is 195 years old. The sample shows a range of past experiences of partnerships; while some LSPs are very active in forming partnerships, others have no prior experience. The maximum number of partnerships formed is 98 and the average value is 18.75 partnerships. 31 LSPs formed partnerships with customers, 28 international partnerships were identified, and 16 LSPs are involved in multiple partnerships for IT-enabled innovations. Only 1 LSP developed multiple IT-enabled innovations with the same partner. *Table 8* shows the Pearson correlation between dependent, independent and control variables used in the hierarchical regression.

Table 7: Descriptive statistics of the independent variables

	Number	Mean	Median	S.D.	Minimum	Maximum
Annual revenue (US\$ millions)		28162.71	12376.45	32775.72	7.31	124623.30
Book-to-market ratio		0.43	0.36	0.35	0.00	1.92
Partnership experience (Number of partnerships)		18.75	5.00	25.25	0.00	98.00
Number of partnerships with customers	31.00					
Number of LSPs developing multiple innovations with the same firm (Customer)	1.00					
Firm age (Years)		54.57	25.00	53.03	6.00	195.00
Number of LSPs	34.00					
International partnerships LSPs involved in multiple partnerships	28.00					
	16.00					

Table 8: Pearson correlation between dependent, independent and control variables used in the hierarchical regression. Firm size is log-transformed

	1	2	3	4	5	6	7	8	9
	CAR	Firm_Age	Multiple	Int_col	Firm_Size	Gr_Pot	Col_CU	Part_Exp	Alli_Part
1	1								
2	-0.034 (0.760)	1							
3	0.081 (0.459)	-0.016 (0.887)	1						
4	0.127 (0.247)	-0.274** (0.011)	-0.066 (0.551)	1					
5	-0.453*** (0.000)	0.123 (0.260)	0.072 (0.510)	-0.303*** (0.005)	1				
6	0.257** (0.032)	-0.203* (0.063)	-0.377*** (0.000)	0.036 (0.746)	-0.055 (0.615)	1			
7	-0.004 (0.972)	0.116 (0.291)	0.213* (0.050)	-0.063 (0.567)	-0.214** (0.049)	-0.097 (0.375)	1		
8	-0.216** (0.048)	-0.233** (0.032)	0.362*** (0.001)	-0.361*** (0.001)	0.480*** (0.000)	-0.071 (0.521)	0.063 (0.567)	1	
9	0.247** (0.023)	-0.113 (0.302)	0.099 (0.367)	0.273** (0.012)	-0.184* (0.092)	-0.180 (0.098)	-0.252** (0.020)	-0.115 (0.295)	1
Mean	0.752	54.576	0.788	0.329	15.313	0.431	0.364	18.752	0.035
SD	2.132	53.032	0.410	0.473	702	0.351	0.484	25.254	0.186

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level.

4.9 Hierarchical regression model

The following regression model is developed to examine the effect of factors identified on the market reaction to collaborative innovation announcements:

$$AR_{i(d1,d2)} = \beta_0 + \beta_1 Firm_Age + \beta_2 Int_Coll + \beta_3 Multiple + \beta_4 \ln(Firm_Size) + \beta_5 Gr_Pot + \beta_6 Col_CU + \beta_7 Part_Exp + \beta_8 Alli_Part + \varepsilon_i \quad (4)$$

A regression was conducted with two models. The first uses the control variables. The second model contains the variables of interest to test the hypotheses.

4.10 Results

Table 9 demonstrates the results of an event study analysed using a multi-country market model and mean-adjusted model to test Hypothesis 1. Hypothesis 1 suggests that partnership for logistics service innovation increases the market value of LSPs. The results of both models are consistent and robust as demonstrated by cross-sectional t-test, Patell Z and t-BMP parametric test results. The event day mean CAR in the multi-country market model is 0.66%, which is positive and significant at 1% using parametric test statistics (Table 9). However, Campbell et al. (2010) caution that in multi-country event studies, non-parametric test statistics should be interpreted as data is less likely to be normally distributed. The non-parametric Corrado Rank test and Generalised Sign test results are significant at 5% and 1% levels, respectively. The results support Hypothesis 1 and suggest that there is a positive market value change when a firm engages in a partnership to develop a service innovation. We subsequently use the multi-country market model CARs for regression analysis.

Table 9: Abnormal returns for the Event Day (0) using two different market models.

Model	n	Mean CAR	% Positive	t-test Cross-sectional	Patell Z	t-BMP	Corrado Rank	Sign Test
Multi-country Market model	121	0.66%	59.5%	3.3062***	3.2937***	2.6326***	2.3359**	2.6253***
Mean-adjusted model	121	0.59%	57.8%	2.600***	2.4729***	1.8472*	2.0351**	2.1881**

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level.

Table 10: Event study results of the analysis for partnership for innovations using multi-country market model.

Period	n	Mean	Median	%Positive	t-test Cross- sectional	Patell Z	t-BMP	Corrado Rank	Sign test
-4	121	-0.30%	0.12%	44.63%	-1.9504*	-1.239	-1.4865	-1.3311	-0.6512
-3	121	0.20%	0.04%	51.24%	1.3469	0.7851	0.9031	1.0385	0.805
-2	121	0.15%	0.10%	53.72%	1.1055	1.0884	1.1271	1.3121	1.3511
-1	121	0.13%	0.01%	50.41%	1.0896	1.4458	1.7116*	0.8648	0.623
0	121	0.66%	0.25%	59.50%	3.3062***	3.2937***	2.6326***	2.3359**	2.6253***
(0, +1)	121	0.30%	-0.05%	49.59%	1.1407	1.7763*	1.5802	0.9936	0.4409
(-1, +1)	121	0.43%	-0.29%	46.28%	1.4163	2.285**	2.193**	1.3106	-0.2872

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level.

Table 11 and 12 present the results of subsamples analysis of IT-enabled innovations and tests Hypothesis 2a. Hypothesis 2a suggests that partnerships for IT-enabled innovations have greater positive impact on market value. The CAR on the event day is 0.80% that is positive; with statistically significant parametric and non-parametric test results. Partnership for innovations without using IT generated a 0.27% abnormal return with insignificant parametric and non-parametric test results, and this is lower than the CAR generated with IT that supports Hypothesis 2a. The mean CAR generated on the event day for IT-enabled innovations will be used in the hierarchical regression model.

Table 11: Abnormal returns for the Event Day (0) of IT-enabled innovations using multi-country market model.

Subsamples	n	Mean CAR	% Positive	t-test Cross- sectional	Patell Z	t-BMP	Corrado Rank	Sign Test
Use of IT	89	0.80%	66.0%	3.4956***	3.5416***	2.9388***	3.229***	3.646***
Without IT	32	0.27%	42.0%	0.6724	0.4985	0.3662	-0.6362	-0.9706

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level.

Table 12: Event study results of partnership for IT-enabled innovations using multi-country market model.

Period	n	Mean	Median	% Positive	t-test Cross- sectional	Patell Z	t-BMP	Corrado Rank	Sign test
-4	89	-0.31%	0.08%	45%	-1.6729*	-0.6359	-0.8246	-0.9333	-0.3892
-3	89	0.36%	0.21%	56%	2.0093**	1.632	2.0275	-0.9333	1.7346*
-2	89	0.22%	-0.02%	49%	1.2905	1.2686	1.2819	1.9352	0.4603
-1	89	0.15%	0.04%	53%	1.0868	1.2001	1.5663	1.0251	1.0974
0	89	0.80%	0.27%	66%	3.4956***	3.5416***	2.9388***	3.229***	3.646***
(0, +1)	89	0.29%	-0.06%	52%	0.9043	1.4536	1.3022	1.0789	0.8851
(-1, +1)	89	0.45%	-0.30%	46%	1.2075	1.8797*	1.9016	1.4492	-0.1768

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level.

4.10.1 Hierarchical regression results

Table 13 presents the results of hierarchical regression for our model. The dependent variable is abnormal returns calculated using the market model in multi-country settings. Model 1 estimates the effect of control variables on abnormal return without including independent variables. Model 2 includes independent variables to estimate the combined effect of independent and control variables on the abnormal returns. Therefore, Model 2 allows us to test the hypotheses and evaluate the relationship between the variables and the abnormal returns; showing support for H3, H4 and H6b. We found no support for H5a and H6a. The sign/direction of all the coefficients were as predicted except for partnership experience. The hierarchical regression results suggest that partnership for innovations can be more beneficial for smaller LSPs.

Table 13. Results of cross-sectional regression analysis (n= 85; four events were dropped due to the unavailability of data and negative book to market ratio). The dependent variable is the event day abnormal return calculated using the market model in multi-country settings

Independent Variables		Model 1		Model 2		VIF
		Coefficient	Robust Std. Error	Coefficient	Robust Std. Error	Model 2
Intercept		0.0586**	0.4059	2.2739**	1.0055	
Firm_Age	Control	0.0013	0.0030	0.0049*	0.0030	1.4563
Multiple	Control	0.1289	0.3707	0.5778*	0.3680	1.4451
Int_Coll	Control	0.4684*	0.3350	0.0838	0.3371	1.4581
Firm_Size	H3			-0.2066***	0.0602	1.5548
Gr_Pot	H4			1.1345**	0.4272	1.2954
Col_CU	H5a			0.1293	0.3024	1.2307
Part_Exp	H6a			0.0009	0.0075	2.0464
Alli_Part	H6b			2.3286***	0.7990	1.2630
F		0.6708		5.4500		
Significance		0.5724		0.0000		
Observed R ²		0.02424		0.3646		
Adj. R ²		-0.0119		0.2977		

Significance levels (one-tailed tests): * 10% level, **5% level, *** 1% level.
Negative Adj. R² value signifies a bad data fit.

4.10.2 Model diagnostics

As the variance influence factors for all variables in Model 2 are less than 5.0, multicollinearity is not considered to be a concern (Cohen, Cohen, West, & Aiken, 2003). The studentised Breusch-Pagan test suggested heteroscedasticity (BP = 18.11, df = 8, p-value = 0.02041) and an analysis of hat-values suggests some influential observations are present (Fox & Weisberg, 2018). The observed statistical power of this regression model is 99.95%, which is sufficient to produce reliable results using 89 observations (Appendix 1). Lyon, Barber and Tsai (1999) recommend the use of a bootstrapped version of the skewness-adjusted t-test that yields well-specified test statistics. When the ARs are positively skewed, the bootstrapping is done to yield skewness-adjusted t-test that will present well-specified test statistics in the long-horizon event studies. This study used a short-horizon event study and used other test statistics to demonstrate the reliability of the test results.

We decided to include these observations in the dataset as removing them from the regression will result in reduced sample size and may induce additional bias in the estimation. We used robust regression, specifically, weighted least squares to address heteroscedasticity and to minimise the weight assigned to the influential observations, thus ensuring the reliability of estimation coefficients and standard errors.

4.10.3 Comparison of the effect of type of partners on CARs

An independent sample t-test was chosen over a regression analysis to compare the means of CARs resulted from using different types of partners for IT-enabled service innovation. This was because a regression analysis using dummy variables to compare the effect of variables against the variable of interest delivers similar results for the same sample size (Bordacconi & Larsen, 2014). While a regression analysis determines if the model is significantly different from the mean (F-test), an independent sample t-test determines if the means are significantly different (Bordacconi & Larsen, 2014).

4.10.3.1 Customers and IT-providers

We found no support for hypothesis 5b. We conducted an independent sample t-test to determine if there is a difference in CARs between partnering with customers and IT-providers for IT-enabled innovations development. There is a no significant difference in CARs for partnering with other customers (M = 0.73, SD =1.93) and IT-providers (M = 0.45, SD = 1.96) conditions; $t(73) = 0.62$ $p = 0.26$ (one-tailed). The mean CARs for partnering with customers is 0.62 times higher than partnering with IT-providers.

4.10.3.2 LSPs and customers

We found support for hypothesis 5c. We conducted an independent sample t-test to determine if there is a difference in CARs between partnering with other LSPs and customers for IT-enabled innovations development. There is a significant difference in CARs for partnering with other LSPs (M = 2.11, SD = 2.98) and customers (M = 0.73, SD = 1.93)

conditions; $t(75) = 1.70, p = 0.02$ (one-tailed). The mean CARs for partnering with other LSPs is 1.89 times higher than partnering with customers.

4.10.3.3 LSPs and IT-providers

We found support for hypothesis 5d. We conducted an independent sample t-test to determine if there is a difference in CARs between partnering with other LSPs and IT-providers for IT-enabled innovations development. There is a significant difference in CARs for partnering with other LSPs ($M = 2.11, SD = 2.98$) and IT-providers ($M = 0.45, SD = 1.96$) conditions; $t(54) = 2.17, p = 0.01$ (one-tailed). The mean CARs for partnering with other LSPs is 3.98 times higher than partnering with IT-providers.

4.10.4 Comparison of partnership with IT and without IT

An independent-samples t-test was used to determine whether there were differences in the market value change to IT-enabled innovations when partnership between cases was used and those when it was not (testing H2b). The market value change was slightly lower for partnership for IT-enabled innovations ($M = 0.80, SD = 2.17$) than for no-partnership for IT-enabled innovations ($M = 0.85, SD = 6.54$); with no statistically significant difference between the means, $t(120) = -0.059, p = 0.47$ (one-tailed).

4.11 Discussion

We provide empirical evidence of the market value change to partnership for innovations and partnership for IT-enabled innovations from the investors' perspective. The results confirm that the impact of both partnership for innovation and partnership for IT-enabled innovations is significantly positive on the event day. The market value change for LSPs' was 0.66%, and 0.80% for partnership for innovations and partnership for IT-enabled innovations, respectively. The result is similar to Panayides (2006) and Panayides and So (2005). The use of partnership for IT-enabled innovations may overcome risks and limitations of resources (Fawcett, Jones, & Fawcett, 2012; Gunasekaran & Ngai, 2003),

improve cost efficiency and innovation capability, which in turn improves the financial performance of LSPs (Wagner, 2013). However, there is an insignificant difference between market values of LSPs that have developed IT-enabled innovations without partnership and LSPs that have developed IT-enabled innovations with partnership. This may be because the investors' perception of LSPs that have internal expertise and capabilities to combine and reconfigure resources might not gain sufficient benefit from forming partnership (Barney, 1991). This enables firms to increase their dependency on the customers, reduce transaction and coordination costs to reap more benefits (Williamson, 1985).

4.11.1 The effect of firm size

Our study adds to the evidence that partnership for innovations is more beneficial for small firms (Kalaiganam, Shankar, & Varadarajan, 2007; Sood & Tellis, 2009) and extends the results to the logistics and use of partnerships for IT-enabled innovations. Compared to larger LSPs, small LSPs are flexible and entrepreneurial (Gunasekaran & Ngai, 2003), possess the know-how of local market (Kalaiganam et al., 2007), but the selection, acquisition and implantation of new technologies for IT-enabled innovations can be a difficult task for small LSPs due to lack of knowledge, skills (operant resource) and funding (operand resources) (Gunasekaran & Ngai, 2003; Kalaiganam et al., 2007). Small LSPs access skills and resources (operant and operand resources) by partnering to develop new IT-enabled differentiated services (Gunasekaran & Ngai, 2003) so as to attain a competitive advantage, gaining prominence over larger LSPs that may lead to the increased likelihood of market success. Using the event study methodology, Sabherwal and Sabherwal (2005) found that the use of IT for knowledge sharing, creation or utilisation helped small and less profitable firms as these firms have greater room for improvements.

4.11.2 The effect of growth potential

Our result suggests that partnership for IT-enabled innovations in high growth LSPs increases the likelihood of market success. The finding is consistent with those of prior studies that have examined the impact of growth potential on IT adoption (Bose, Lui, & Ngai, 2011; Oh, Kim, & Richardson, 2006). LSPs with low growth potential are likely to take greater risks due to the expectations of low profitability (Oh et al., 2006). The high cost of capital required for innovation (Hall, 2002) with new technologies can be a risky endeavour for them. In contrast, LSPs with high growth potential have excess cash (cash is an operand resource) (Brooke & Oliver, 2005) that they can divert to innovation development. Moreover, the logistics market is competitive (Li & Chen, 2019). Our finding suggests that high-growth LSPs operating in a competitive environment may benefit from partnerships that support a gain of market share with the best use of the operand and operand resources available to them.

4.11.3 The effect of collaborating partners

Contrary to prior studies supporting partnership with customers for innovations development (Bellingkrodt & Wallenburg, 2013, 2015; Rajahonka & Bask, 2016; Wagner, 2008; Wagner, 2013) we found no statistical support for this claim although the sign of the coefficient presented in Table 9 is in the direction predicted. One of the possible reasons for the unexpected result is that investors do not value IT-enabled innovations when these resource-intensive services (Sauvage, 2003) that are customised and implemented to solve specific problems. The investors may not be aware that LSPs are planning to standardise and extend those services to other customers. Overall, partnership for IT-enabled innovations can reduce risks, improve communication, and develop trust to utilise inter-firm resources (Fawcett et al., 2012). Depending on the nature and requirement of resources for a particular IT-enabled innovation, LSPs identify and utilise resources controlled by other partners,

supplementing with their resources to develop new IT-enabled differentiated services to achieve competitive advantage. For example, to expand in a new market, partnership with either customers or IT-providers may not add much value. LSPs need to identify other LSPs with complementary resources for the development of IT-enabled innovations.

Additional analysis has demonstrated that partnership with other LSPs generated a greater magnitude of market value change compared with partnership with IT-providers (statistically significant) or customers (statistically significant).

4.11.4 The effect of partnership experience

Our finding of a positive coefficient for partnership experience with no statistical support for its effect on the LSPs's market value change is consistent with prior studies (Anand & Khanna, 2000; Gulati et al., 2009; Liu & Ravichandran, 2015). The present study shows statistical support for the positive effect of multiple innovations with the same partners (Customer) on the market value of LSPs. The result is consistent with Yiu, Ngai, & Lei (in press), who showed that past learning with partners to develop and offer services has a positive influence on the company's innovation performance. Partnership experience can be attributed to learning superior capabilities to form and manage partnerships. (Liu & Ravichandran, 2015). LSPs can benefit from their previous experiences if they were: a) successful and related to the current partnership, or b) used in a related domain with the specialised knowledge acquired from interconnecting their operant resources (Madhavaram & Hunt, 2008) with their partners' operant resources. Successful innovation in a particular partnership may motivate an LSP and its partner to continuously develop innovations in extended relationships (Soosay, Hyland, & Ferrer, 2008), leading to a greater likelihood of market success. A recent study also reports that the higher-order capabilities enabled by the

information systems improve firm performance (Felipe, Leidner, Roldán, & Leal-Rodríguez, in press).

Rapid IT developments influence logistics, and LSPs' customers have increasingly expressed interest in procuring innovative IT-enabled services (Langley & Infosys, 2019). However, IT adoption by LSPs has not been growing that fast (Evangelista, McKinnon, & Sweeney, 2013). The lack of related partnership experience among LSPs might be one of the reasons for negative market returns. One avenue for future research is to find contextual factors which influence partnership for IT-enabled innovations development.

4.12 Conclusion, limitations and future research

Based on a sample of 121 announcements of partnership for innovations announcements and the subsample of 89 announcements for IT-enabled innovations made during 2007-01-01 and 2017-12-31, we found significant positive increase in the market value of LSPs for both partnership for innovations (0.66%) and partnership for IT-enabled innovations (0.80%) on the event day. We found partnership for IT-enabled innovations resulted in a more positive increase in the market value of LSPs compared to the overall partnership for innovations. The findings are consistent with the S-D logic framework and competitive advantage, supporting knowledge exchange among LSPs and their partners leading to attaining competitive advantage and increase in market value. Partnership with LSPs and IT-providers are found to generate greatest and lowest increase in the market values of LSPs respectively.

Our study supports that partnership for IT-enabled innovations reduces overall risks and addresses limitations of resources; partnership is more beneficial for small and high growth LSPs. Our study recommends small and high growth LSPs develop a long-term positive relationship with partners for developing multiple innovations with them to increase the

likelihood of innovation success. Small and high growth LSPs need to develop strategies to identify suitable LSPs, customers or IT-providers, in decreasing order, to utilise their resources for IT-enabled innovations. Firms with adequate internal expertise and resources might not gain much benefit from partnerships.

The findings of this research provide quantitative evidence of the value of knowledge exchange, skills and competencies for IT-enabled innovations to create value for the end customers and achieve superior financial performance, influenced by various firm- and partnership-level factors. Although prior studies have highlighted the potential benefits of partnership for innovations, empirical studies grounded in theories are few and often rely on perceived benefits and survey responses. Our findings are in line with the S-D logic worldview, emphasising the importance of operant resources in achieving competitive advantage. Moreover, partnership for IT-enabled innovations accentuates utilisation of operant resources of different partners in a way that can complement each other's resources limitations; i.e., by developing interconnected operant resources (Madhavaram & Hunt, 2008), allowing small and high growth LSPs to increase the likelihood of improving their financial performance. However, in line with the RBV, firms with resources and capabilities developed in-house may derive the same benefits as firms that form partnerships to access external resources.

From the managerial perspective, this study provides two main implications. Partnership for IT-enabled innovations leads to positive financial performance and this is more beneficial for small and high growth LSPs. The present study views knowledge exchange between LSPs and their partners as a complementary resource, suggesting that IT-enabled innovations should not be developed in isolation. Managers should realise that collaborative IT-enabled services innovation is like the development of new products, it is a tool for generating new

logistics services ideas that provide competitive advantage leading to improved financial performance (Yiu et al., in press). Managers of small and high growth LSPs should carefully examine the service requirements, assess the availability of their resources and then find a suitable partner that can complement resources they are lacking.

Long-term positive relationships with partners are important, particularly for small and high growth LSPs. Long-term positive relationships may improve communication between LSPs and their partners, and provide a supportive environment to discuss and develop innovations (Wallenburg & Lukassen, 2011), necessary because IT-enabled logistics services implemented and customised for a particular customer may pose difficulty in terms of standardising and extending those services to other customers having different service requirements (Wagner & Franklin, 2008). Our results suggest that while individual partnership experience with multiple customers leads to a lower increase in the market value, multiple innovations with the same partner generate more benefit. The benefits of partnership and developing positive relationships have been discussed in contemporary literature (Daugherty, Chen, & Ferrin, 2011; Hazen & Byrd, 2012; Klein, Rai, & Straub, 2007); our study provides additional support to motivate managers to develop and maintain long-term positive relationships with partners to foster successful IT-enabled innovations development.

This event study has several limitations. First, there is heterogeneity in the sample as we considered a broad range of announcements on strategic alliances, joint ventures, or acquisitions in LSPs' innovation context for analysis. Over time, as more announcements appear, future studies can measure the effect of distinct partnership mechanisms on financial performance. Second, we only considered the announcement of partnerships for IT-enabled innovations; the market value change is an estimate of the effect and actual

outcomes may differ. Future studies can adopt case study methodology to understand contextual factors, for example, success or failure of projects, partnership intensity or nature of projects influencing willingness and openness of partners for development of innovations in partnership.

Appendix 1: Validation of effect size and statistical power for the regression analysis

This appendix calculates the effect size and the statistical power to understand the magnitude of difference between variables resulted from the cross-sectional regression analysis. A small subsample size of this analysis (85 observations) might be a concern for the relevance of cross-sectional regression results. However, if the effect size is large enough, it is possible to detect a statistically significant difference (Cohen, 2013). Conversely, it is possible that a large sample size may detect a difference that is very small and trivial, inadequate to provide significance to the results. Cohen (2013) suggested reporting both the effect size and the statistical significance is essential to fully understand the results.

Using Cohen's (2013) formula provided below as equation (6), the effect size of the independent variables of our cross-sectional regression model is 0.56.

$$f^2 = \frac{R^2}{1 - R^2} \quad (5)$$

Where R^2 is observed R^2 value, obtained from the cross-sectional regression results. Cohen (2013) defined the effect size values near 0.02 as small, near 0.15 as medium, and above 0.35 as large. Based on Cohen's (2013) definition, the effect size of our regression model is medium.

Statistical power is the probability of cross-sectional regression analysis that reveals a statistically significant difference between variables when an actual difference between them does exist. If statistical power is high, the probability of determining the difference between variables is also high (Sullivan & Feinn, 2012). Statistical power is calculated as $1 - \beta$, where β is the probability of accepting a false null hypothesis. The statistical power of this

analysis is calculated as 0.999, higher than the threshold value of 0.80 as suggested by Cohen (2013).

The above analysis confirms that 85 is an adequate sample size with a medium value of effect size and acceptable statistical power for the present regression analysis. The results provide relevance to predict the relationship between the dependent and independent variables with high certainty.

Chapter 5 Manuscript 2: Environmental sustainability

Title: Impacts of announcements of circular economy initiatives and partnership on the market value of the firms.

Preface

The second manuscript extends the focus from LSPs to intra-organisational business processes that use virgin raw material for production. The linear system based on take, make, and discard is not environmentally effective as the products often end up in landfills after the end of their useful life. This leads to scarcity of natural resources and increases the risk of production disruption and the loss of profits (MacArthur, 2013). Firms can adopt CE, an innovative concept that relies on the indefinite use of raw materials. This practice not only reduces the firm's reliance on the virgin raw materials, which improves environmental sustainability, but also contributes to substantial savings (Ellen MacArthur Foundation, 2017). However, firms lack resources, knowledge and skills to implement CE in their business processes. They need to partner with firms to source the required knowledge, skills, financial resources, and raw materials. Manuscript 2 aims to examine how partnership for CE influences the financial performance of focal firms in the supply chain and what factors influence it, using a multi-country event study methodology. This manuscript answers the second sub-research question.

5.1 Introduction

A linear "make-use-dispose" economic model has dominated economies since the Industrial Revolution. In this economic model, firms extract resources from the earth to make products, and consumers dispose of the products at the end of their lives, with most of the used products ending up at landfills (MacArthur, 2013). In this model, little thought is given to the consequence of depleting the earth's finite natural resource reserves (Murray, Skene, & Haynes, 2017). For example, at the current rate of extraction, aluminum will run

out in the next 80 years, and fossil fuels such as coal and oil will deplete within 115 years (BP, 2016; Nuwer, 2014). As the world's population and resource consumption has grown in the past few decades, the physical limits of the linear economic model have been reached (Ellen MacArthur Foundation, 2014), and resource scarcity has increasingly become an issue of global concern, especially for future generations (Hoorweg & Bhada-Tata, 2012).

In addition to the depletion of scarce resources, the linear economic model has also created the problem of high emissions and waste. The burning of fossil fuels has generated a large amount of greenhouse gas emissions, which are believed to be the key cause of global warming and climate change. The increasing amount of solid waste has become a major challenge to both developed and developing countries. Up to 66% of all processed materials end up as waste and emissions (Haas, Krausmann, Wiedenhofer, & Heinz, 2015; Jacobsen, Willeghems, Gellynck, & Buysse, 2018). The problems resulting from the excessive extraction of natural resources and environmental damages are expected to worsen in the future (Fellner, Lederer, Scharff, & Laner, 2017; Pollard, Turney, Charnley, & Webster, 2016; Yong, 2007).

In recent years, the concept of the "circular economy" (CE) has emerged to address these challenges, with the goal of using natural resources much more sustainably (Geissdoerfer, Savaget, Bocken, & Hultink, 2017). A CE is "restorative and regenerative by design" (MacArthur, 2013). In a CE, resources circulate in an infinite loop to maintain their value and utility at the highest level by managing finite stocks and renewable flows (Yang, Smart, Kumar, Jolly, & Evans, 2018). In CE, a key distinction is made between technical materials (e.g., metal and plastics) and biological materials (e.g., food waste). Technical materials are circulated in *restorative* cycles for reuse, while biological materials are circulated in *regenerative* cycles to enhance natural capital. Through the circularity of resources and value

recovery from end-of-life products, CE aims to achieve a zero-waste vision. Furthermore, using renewable energy to power CE activities further reduces greenhouse gas emissions. Consequently, the CE paradigm is best placed to overcome the long-standing challenge faced by society: decoupling resource consumption and emissions from economic growth.

However, despite the promised benefits, CE implementations have only made modest progress across the globe (Mathews & Tan, 2016; Wassenhove, 2019). This is perhaps because it can be difficult, costly and risky for a firm to switch from a linear to a circular model (Bag, Gupta, & Foropon, 2018; Ellen MacArthur Foundation, 2017). This implies that firms will change their economic models when they have evidence that the financial benefits resulting from the shift will be enough to overcome the attendant costs and risks.

The question as to whether CE implementations may enhance a firm's financial performance is difficult to answer for a few reasons. First, CE initiatives involve a high degree of complexity as they aim to transform the supply chain, encompassing activities from resource extraction and production to end-of-life product and waste management (Farooque, Zhang, & Liu, 2019; Farooque, Zhang, Thurer, Qu, & Huisingsh, 2019; Ghisellini, Cialani, & Ulgiati, 2016). Firms are rarely able to reuse or recycle all of their end-of-life products and materials by themselves in a closed-loop supply chain, and thus often need to partner with firms in the same sector or from other sectors to fully recover value from waste (Farooque et al., 2019). Consequently, a lack of partnership mechanisms, for example, collaboration or coordination between firms, has been found to be a barrier to CE implementation (Farooque et al., 2019; Govindan & Hasanagic, 2018; Tura et al., 2019). However, the impact of partnerships for CE initiatives on a firm's financial performance is unclear.

This study aims to address the knowledge gaps mentioned above to provide insight on the impact of CE implementation on the financial performance of firms and the role of partnerships. To the best of our knowledge, this is the first study that has studied these relationships. Specifically, this study achieves the following research objectives:

- To understand the relationship between CE initiatives and financial performance
- To examine whether partnerships affect the relationship between CE initiatives and financial performance
- To investigate the influence of certain factors on the performance outcome of CE initiatives that use partnership

This study uses the short-term event study methodology to estimate the stock market reaction to firm announcements of CE initiatives. The study examines the significance and magnitude of the stock market reactions and explores the factors that influence this impact, with a focus on the role of partnership. This methodology puts to the forefront the question as to whether investors, as the main stakeholders in publicly owned businesses, notice, respond and reward firms that implement CE practices. Secondary data from Factiva and DataStream are used to test several hypotheses grounded on the natural resource-based view (NRBV) (Hart, 1995; Hart & Dowell, 2011) and the relational view of the firm (Dyer & Singh, 1998).

The remainder of this article is structured as follows. Section 2 establishes the links between CE practices and the NRBV and relational view. These theoretical lenses are used to develop hypotheses in Section 3. Section 4 describes the event study methodology and the hierarchical regression model. Section 5 presents the results of the event study and hierarchical regression analysis. This section explains the reactions of the stock market to announcements of CE initiatives, and how these reactions are influenced by the presence of

partners and other key factors. Section 6 discusses theoretical and managerial implications. Section 7 concludes the research.

5.2 Theoretical background

5.2.1 The natural resource-based view (NRBV)

The resource-based view of the firm (RBV) (Barney, 1991; Wernerfelt, 1984) argues that a firm's idiosyncratic resources and capabilities are the source of its competitive advantage. According to the RBV, the potential for economic value creation increases when a firm's specific resources and capabilities become more valuable, rare, inimitable and difficult to substitute (Amit & Zott, 2001).

Compared to the RBV's internal focus, the NRBV (Hart, 1995; Hart & Dowell, 2011) examines how firm outcomes are affected by the interaction between a firm and the natural environment it operates in. Considering this dimension is important because natural resources are finite, and a firm's ability to manage natural resource constraints affects its performance. The NRBV further describes how the interaction of a firm with the natural environment can lead to the development of specific resources to enable strategic capabilities (Hart, 1995). At the firm level, the capability of pollution prevention minimises emissions, effluent and waste. By utilising continuous improvement, firms with this capability are able to realise the competitive advantage of lower costs. At the supply chain level, the capability of product stewardship goes beyond production costs to minimise the life-cycle cost of products. It depends on stakeholder integration across a supply chain to pre-empt competitors. At the industry/global level, the capability of sustainable development minimises the environmental burden of firm growth and development. It is accomplished through a shared vision to sever the negative links between environment and economic activity. Clean technologies play a crucial role in developing a sustainable development capability (Hart & Dowell, 2011).

This research chooses the NRBV as a theoretical lens because its motivation coincides with what motivated the development of the CE concept. Prior studies applied the NRBV in the sustainability context and reported a positive relationship between sustainability strategies/activities and firm financial performance (Choi & Hwang, 2015; Lee & Klassen, 2008; Shi, Koh, Baldwin, & Cucchiella, 2012). However, the sustainability strategies that have been investigated by prior researchers are different from CE, a relatively new and innovative concept that incorporates circular thinking which was not present in traditional sustainability strategies, including green strategies. In addition, none of these studies examined whether the three levels of strategic capabilities outlined in the NRBV, namely, pollution prevention, product stewardship, and sustainable development, have different performance implications.

5.2.2 The relational view

In contrast to the RBV, the relational view argues that competitive advantage can be attained, not from internal resources, but from inter-organisational networks and relationships across organisational boundaries (Dyer & Singh, 1998). The relational view asserts that partnerships between organisations create relational value or rent, through the joint contributions of the allied partners (Dyer & Singh, 1998). To reap relational rents, partners need to invest in various assets, to share knowledge and learning, to combine resources and capabilities to create new products and services, and to use advanced governance processes to minimise transaction costs (Dyer & Singh, 1998).

In this research, the relational view is used as a second theoretical lens to complement the NRBV. The relational view has been applied in the supply chain context to explain the buyer-supplier partnership mechanism (e.g., Touboulic & Walker, 2015; Vijayasathya, 2010; Walker et al., 2014). Other studies have applied the relational view to environmental

collaboration for improving environmental performance (Sancha, Gimenez, Sierra, & Kazeminia, 2015; Touboullic & Walker, 2015). The results of these studies demonstrated that environmental partnerships between multiple stakeholders, for example, suppliers, customers, and government organisations, expand inter-firm capabilities, which in turn improve a firm's environmental performance and competitiveness (Canning & Lloyd, 2001; Gold, Seuring, & Beske, 2010; Vachon & Klassen, 2008). However, the relational view has not been applied in a CE context where partnership is often required for value recovery through resource exchanges.

5.3 Hypothesis development

This section develops two sets of hypotheses based on the dual theoretical lenses of the NRBV and relational view. The first set of hypotheses theorise the impact of CE initiatives on the financial performance of the firms and the role of partnership. The second set of hypotheses are formulated on the effect of firm-level factors, specifically, prior positive environmental performance, growth opportunities and financial slack, on the financial performance of the firms when they initiate CE practices in partnership.

5.3.1 Impact of CE initiatives and the role of partnership

5.3.2 Impact of CE initiatives

According to the NRBV, CE initiatives offer several benefits for firms to gain a competitive advantage leading to better operational and financial performance. First, CE is a compelling long-range vision shared by the public, business leaders, and the world's major economies. According to Hart (1995), a shared vision is "the key to generating the internal pressure and enthusiasm needed for innovation and change", a rare firm-specific resource for sustainable competitive advantage and long-term growth. CE initiatives align the activities of the firm with the shared sustainability vision of the public, and therefore enhance the firm's reputation and legitimacy (Hart & Dowell, 2011). A reputable firm is more likely to increase

its sales, lower contractual costs, and consequently, improve financial performance (Roberts & Dowling, 2002). For example, Philips has incorporated CE into its strategic vision (Fleming & Zils, 2014). Driven by the CE vision, it innovated its business model to sell light as a service instead of selling bulbs. Its customers pay for the light consumed, while the firm takes care of the technology and the investment. Philips takes the bulbs back for recycling or upgrading when necessary, allowing them to reuse components and recover materials. Philips believes that customers consider the use of natural resources in their buying decisions and give preference to the firm that shows responsible environmental and social behaviour.

Second, CE implementation can lower production costs as well as product life cycle costs. CE practices including reuse, repair, remanufacture, and recycle, and require fewer virgin raw materials. They lead to reduced material and processing costs while producing less emissions, improving operational performance and environmental compliance (MacArthur, 2013). Using materials recovered from used products reduces the energy consumed to produce each unit of new product contributing to energy savings. The overall savings in cost and emission can be very substantial as a result of a CE implementation. For example, an European-wide CE implementation has the potential to reduce CO₂ emissions by up to 17% and its economic benefits are estimated at 4.5 trillion Euros, including the creation of two million jobs by 2030 (Ellen MacArthur Foundation, 2017; Lacy & Rutqvist, 2016).

Last, CE initiatives indicate a firm's proactivity in managing supply risks and improving its supply chain resilience to ensure the continuous availability of raw materials for production. As mentioned earlier, the growth in demand for resources in the past few decades has put tremendous pressure on the ecological system and the depleting natural resource reserves. This is a key reason why Hart (1995) developed the NRBV. Consequently, there are increasing risks of a shortage of raw material supply and of price hikes of raw materials (MacArthur,

2013). For example, fluctuations in the supply of rhenium cost GE an extra billion dollars due to production losses between 2006 and 2016 (Gaustad, Krystofik, Bustamante, & Badami, 2018). As CE initiatives recover raw materials from waste, they provide firms with an in-house source of raw materials to mitigate the supply risk, to reduce potential production loss, and to improve supply chain resilience and financial performance (Gaustad et al., 2018).

In short, CE implementation creates a shared vision, improves firm reputation and legitimacy, reduces production and product life cycle cost, and mitigates supply risk. Investors may appreciate the resulting benefits of increased revenue, lower operating cost and higher supply chain resilience. Therefore, we propose the following hypothesis:

H1: Firms that announce CE initiatives will experience a positive stock market reaction

5.3.3 Impact of different strategic capabilities developed by CE initiatives

Based on the NRBV, CE initiatives can develop strategic capabilities at three levels (from low to high): pollution prevention, product stewardship, and sustainable development (Hart, 1995; Hart & Dowell, 2011). These capabilities address environmental issues at different levels using different resources and provide different sources of competitive advantage. Pollution control is a firm-level capability, often referred to as 'low hanging fruit', to enhance internal efficiencies in production and operations (Hart, 1995). Hart (1995) argued that firms, after getting some initial success, would progressively face greater difficulties in continuously reducing emissions. Firms can purchase off-the-shelf solutions, implement pollution prevention technologies by themselves or partner with other firms to develop emissions prevention solutions jointly. For example, Maersk has partnered with AkzoNobel to reduce shipping carbon emissions (AkzoNobel, 2017).

In comparison to pollution prevention, product stewardship is a supply chain level capability which employs more advanced practices that span beyond firms' boundaries. Such

practices include design for the environment, life-cycle analysis, reverse logistics, product lifetime extension through reuse/repair, and remanufacturing. Compared with pollution prevention, development of product stewardship as a capability for initiating CE practices enables a firm to reduce raw material costs and minimise the environmental costs of their products and the operational processes that support production with waste as raw material (Shin, Ellinger, Nolan, DeCoster, & Lane, 2018). This would lead to significant savings. Additionally, an increase or decrease in the competitive advantage of firms depends on the level of CE strategies (Hart & Milstein, 2003). At the lower levels, CE strategies primarily focus on continuous incremental improvements in existing products and processes. At the higher levels, CE strategies gradually move to innovation by developing new products or processes. In the CE context, the level of strategies decreases from pollution prevention (firm-level), to product stewardship (supply chain level) and finally, to sustainable development (global level) (Hart, 1995). This provides firms with a gain in competitive advantage leading to an increase in their financial performances. Therefore, CE initiatives focusing on product stewardship generates higher level capabilities which are socially complex and casually ambiguous, contributing to the pre-emption of competitors and achieving competitive advantage and better financial performance (Hart & Dowell, 2011).

Sustainable development involves a close relationship with external stakeholders to identify future opportunities for clean technology innovations and the the development of markets for low-impact products (Hart & Dowell, 2011). In contrast to pollution prevention and product stewardship whose benefits are incremental, sustainable development capabilities bring about clean technology innovations and new products which are disruptive in nature (Hart & Dowell, 2011). For example, a firm that develops a technology to convert waste wood into energy in partnership with another organisation contributes towards the

dual goal of sustainable development and improving its financial performance. Firstly, the firm achieves a reduction its own environmental footprint. Secondly, it can sell the technology to other firms to help them reduce their environmental impact as well, thus making a global and industry-wide impact. Therefore, we argue that CE initiatives directed towards sustainable development provide the firm with a greater competitive advantage and better financial returns than those focusing on product stewardship and pollution prevention.

In summary, CE initiatives can focus on strategic capabilities at different levels, ranging from pollution prevention at firm-level and product stewardship at the supply chain level, to sustainable development at global/industry level. A strategic capability at a higher level involves more sophisticated practices and creates greater innovation abilities, so it is expected to contribute more to long-term growth and competitive advantage. Therefore, we propose the following propositions:

H2a: Firms that announce CE initiatives focusing on product stewardship will experience more positive stock market reaction those focusing on pollution prevention

H2b: Firms that announce CE initiatives focusing on sustainable development will experience more positive stock market reaction those focusing on pollution prevention

H2c: Firms that announce CE initiatives focusing on sustainable development will experience more positive stock market reaction those focusing on product stewardship

5.3.4 Partnership for CE initiatives

Partnership is a collaborative arrangement between two or more firms to suitably leverage and deploy inter-firm resources, for example, knowledge, skills, expertise, technology, and physical infrastructures, to achieve organisational goals (Dyer & Singh, 1998; Wittmann, Hunt, & Arnett, 2009). The demand for extra resources and capabilities often motivates firms to form partnership with other firms (Hamel, Doz, & Prahalad, 1989;

Miller & Shamsie, 1996). Dyer and Singh's (1998) relational view suggested that a firm can derive a competitive advantage from its cooperative relationships with other firms. For example, manufacturer and supplier partnership can help improve production efficiency, reduce transaction costs, and maximise transaction value (Dyer, 1997).

In a CE implementation, a firm often needs to collaborate with other firms in waste-to-resource initiatives. Typical CE practices including reuse, remanufacture and recycle often require multiple supply chain stakeholders to cooperate with each other to optimise material and energy flows (Mishra, Chiwenga, & Ali, 2019). Ideally, firms in the circular supply chain partner with each other to create and manage an infinite loop of reusing the same natural resources to produce new products by remanufacturing or recycling processes (Genovese, Acquaye, Figueroa, & Koh, 2017). Benefits associated with CE partnership include reduced natural resource consumption, cheaper sourcing, improved production efficiency, and reduction of waste disposal and emissions (Jacobsen, 2006; Sadovnikova & Pujari, 2017; Vachon & Klassen, 2008). Consequently, investors are likely to have a more positive outlook on firms that implement CE in partnership with other firms. Therefore, this study proposes the following hypothesis.

H3: Firms that announce CE initiatives in partnership will experience more positive stock market reaction than those without partnership

5.4 Factors influencing the effect of CE partnership

5.4.1 Prior positive environmental performance

The prior positive environmental performance of a firm may influence other environmentally-conscious firms to partner with it in CE initiatives, resulting in the partners benefiting from the social legitimacy of the focal firm, which can be termed "reflected glory" (Hart & Dowell, 2011; Sadovnikova & Pujari, 2017). Hart (1995) advocated that a firm's success depends not only on its competitive position, but also on its social legitimacy, and

the relationship with other firms appears to be crucial in the pursuit of legitimacy. Firms need to demonstrate their concerns for the environment by developing strategic capabilities to reduce their environmental footprint (Hart & Dowell, 2011).

Prior positive environmental performance may provide investors with confidence in the firm announcing CE initiatives for two main reasons. First, prior positive environmental performance shows that the firm that initiates CE practices is environmentally proactive (Perey, Benn, Agarwal, & Edwards, 2018). Environmentally proactive firms usually do more than comply with minimum legal requirements to reduce their environmental footprint (Aragón-Correa & Sharma, 2003; Hart & Dowell, 2011; Sadovnikova & Pujari, 2017; Sharma & Vredenburg, 1998). Second, prior positive environmental performance indicates that firms that initiate CE practices have already developed capabilities and environmental expertise to address environmental issues (Sadovnikova & Pujari, 2017). Consequently, investors may feel more confident about the financial performance of firms that initiate CE practices in partnership and have demonstrated prior positive environmental performance than those without prior positive environmental performance.

H4: Firms that announce CE initiatives in partnership with prior positive environmental performance will experience more positive stock market reaction than those without prior positive environmental performance.

5.4.2 Growth opportunities

Growth opportunities of the firms are the investment opportunities which often exist in developing new products, new partnerships, and new markets (Kester, 1986). Firms can have either high or low growth opportunities that depend on their capabilities in using their resources. Firms with high growth opportunities have the capability to generate at least 25% growth in sales per year (Moreno & Casillas, 2007). Such firms are characterised as innovative firms and a major portion of their revenue comes from selling innovative

products. According to the NRBV, firms may lack competitive advantage due to the absence of specific resources and capabilities (Barney, 1991; Hart & Dowell, 2011). Firms with both high and low growth opportunities may be motivated to partner with other firms to acquire extra resources to attain a competitive advantage (Dyer and Singh, 1998).

Growth opportunities of firms affect financial performance (Fama & French, 1992). Past event studies investigated the effect of growth opportunities on the market value of the firms in finance (Pilotte, 1992), IT investments (Oh, Kim, & Richardson, 2006), IT adoption (Bose, Lui, & Ngai, 2011), and green supply chain management (Bose and Pal, 2012). A CE implementation has the obvious benefit of saving costs by reducing the use of virgin raw materials and energy, and reducing waste disposal costs. When a firm with high growth opportunities announces a partnership for CE initiatives, the stock market may see this information merely as a confirmation of new projects and their capabilities to implement it. In contrast, when a firm with low growth opportunities announces a partnership for CE initiatives, the stock market may value it much more, as the investors do not have high expectations of this firm. Prior research has found that unexpected announcements have a greater likelihood of influencing stock market reaction than expected announcements (Bose & Pal, 2012). Hence, this research argues that announcements of CE initiatives in partnership by firms with low growth opportunities will be viewed more positively by investors than high growth firms. Therefore, the following hypothesis is proposed:

H5: When announcing CE initiatives in partnership, firms with low growth opportunities experience more positive stock market reaction than those with high growth opportunities.

5.4.3 Financial slack

Financial slack is a firm's excessive financial resources that are not required to maintain its operations (Ang & Straub, 1998), or its borrowing capacity which "consists of future resources that can be generated from the markets by raising additional debt or equity

capital" (Cheng & Kesner, 1997, p. 2). The latter is known as financial leverage; a low level of financial leverage implies a high level of financial slack that has positive effects on financial performance (Daniel, Lohrke, Fornaciari, & Turner, 2004). Financial slack resources can be used as discretionary funds (Dimick & Murray, 1978) and provide a firm with the flexibility to change its direction in response to changes in the external environment. According to the RBV (Barney, 1991; Wernerfelt, 1984) and NRBV (Hart, 1995; Hart & Dowell, 2011), financial slack is a firm resource which can be used to obtain a competitive advantage.

Due to the newness of the CE concept, many firms do not have capabilities necessary for successful product development using waste as raw materials (Mangla et al., 2018). They also may not have the technological know-how and skills to establish an effective and efficient forward and reverse flow of materials, information and finances. Partnership for CE initiatives may help acquire missing capabilities. However, significant financial resources may still be required as CE initiatives for upgrading existing technologies can be capital-intensive (Sauvé, Bernard, & Sloan, 2016). Several recent studies identified the lack of financial resources as one of the major barriers to CE implementation (Kirchherr et al., 2018; Mangla et al., 2018; Masi, Kumar, Garza-Reyes, & Godsell, 2018; Tura et al., 2019). Apparently, financial slack can help firms obtain additional resources for developing strategic capabilities in CE to obtain a competitive advantage. Therefore, we propose the following hypothesis:

H6: When announcing CE initiatives in partnership, firms with more financial slack (low financial leverage) will experience more positive stock market reaction than those with less financial slack (high financial leverage).

5.5 Methodology and data

The short-term event study methodology is applied to analyse how announcements affect the stock market reaction. The method has previously been used to examine the

impact of partnership events such as alliances (Das, Sen, & Sengupta, 1998) or acquisitions (Dixon Wilcox, Chang, & Grover, 2001) because such announcements are believed to spur investor reaction. Using event studies, researchers estimate the aggregate impact of investor response to the specific events in a particular industry, for example, announcement of strategic alliances in the manufacturing industry for new product development, is dependent on how investors perceive a strategic alliance will influence future cash flow of the announcing firm (McWilliams & Siegel, 1997). According to the efficient market hypothesis, a stock market quickly absorbs publicly available information, for example, the announcement of strategic alliances, and reacts with an increase, decrease or no change in the stock prices (Fama, 1970). Hence, the investor behaviour in response to the announcements when they became public, known as event day, may be different (i.e. observed normal returns) to their behaviour in the absence of such events (i.e. estimated normal returns) (Brown & Warner, 1985). The difference in the observed and the estimated normal returns is known as abnormal returns that reflect an unbiased estimate of the impact of the event. The reliability of the event study method has been well-established in the literature (Henderson, 1990). and the method has been used to study situations such as recalls (Wood, Wang, Olesen, & Reiners, 2017), production or shipment delays (Hendricks & Singhal, 2003), and product design (Xia, Singhal, & Zhang, 2016).

5.5.1 Sample

The research sample consists of announcements of CE initiatives. We followed several steps to create a sample. First, we consulted the literature to identify the relevant keywords (listed in Table 14) to use in searching announcements related to CE initiatives. We searched relevant announcements in Factiva in *all sources, all regions and all industries between 23/06/2009 to 31/12/2018*. The start date is the date of establishment of the Ellen

MacArthur Foundation, an organisation that spearheaded the promotion and education of the CE concept. The CE concept was not known by most firms before the works of the Ellen MacArthur Foundation. The end date indicates the date of start of this study. The identified announcements were read and scanned for their relevancy to CE. If the announcements were found relevant, we checked whether they were from publicly listed firms. The screening resulted in an initial sample of 158 relevant announcements of publicly listed firms including multiple announcements from the same firms in a given year.

Table 14: Announcement search keywords

Keywords	Total number of announcements	Initial sample
Circular economy or circular supply chain	5384	124
Zero-waste or no-waste or closed-loop	22865	25
closed-loop supply chain or open-loop supply chain or circularity	807	9
Closed-loop reuse or closed-loop repair or closed-loop remanufactur* or closed-loop recycl*	3	0
Open-loop supply chain or open-loop reuse or open-loop repair or open-loop remanufactur* or open-loop recycl*	1	0
Cross-sector reuse or cross-sector repair or cross-sector remanufactur* or cross-sector recycl*	0	0
Regenerative cycle or regenerate material or material regeneration	18	0
Restorative cycle or restore material or material restoration	15	0
circulate material or material circulation	42	0
Total		158

Second, we followed a two-step process to confirm the earliest announcement date, known as event date, of each announcement (Park, Park, & Zhang, 2003). In the first step, we used Factiva to search all sources with the firm's name as it appeared in each announcement and sorted search the results by 'oldest first'. In the second step, we cross checked the date of announcements from the firms' websites. If discrepancies in the dates were found, the date mentioned on the firms' websites was used in the analysis. For non-listed subsidiaries operating in countries other than listed parent organisations, the event date was the earliest trading day in countries where their parent organisations were listed.

For firms cross-listed on different stock exchanges, the location and the date of announcements were matched to the location of stock exchanges. For example, if Honda Motors, listed on both the New York and Tokyo stock exchanges, made an announcement in the USA, we measured the stock market reaction to this announcement in the USA due to the higher propensity of capturing the sentiments of local investors. Next, we identified firm identifiers, the location of their headquarters and the stock exchanges where the firms were listed to collect stock prices and stock index data. We also verified whether firms were active by looking at changes in their trading volumes during the event window.

Lastly, we excluded confounding events to ensure the change in the market value of the firms was caused only by CE related announcements. Therefore, each announcement was checked during a time interval, known as event window, to identify whether other financially relevant news occurred during that event window. Shorter event windows are preferred over the longer event windows as they reduce the probability of confounding events interfering with market reaction and improve the power of the test statistic (Brown & Warner, 1985). For each announcement, we searched confounding events one day before and one day after, a three-day window (-1, 0, +1), the announcement dates for each announcement in the sample. We used Factiva to identify declarations of earnings and dividends, equity offerings, quarterly and annual results, awards, collaboration and partnership announcements, and changes in the role of key executives (McWilliams & Siegel, 1997). For non-listed subsidiaries of listed parent organisations, a confounding events check was performed for both subsidiaries and their parent organisations in a three-day event window. We removed 53 announcements not satisfying the criteria, leaving 105 announcements in the final sample for analysis. The final sample consists of 58% announcements from Europe, 21% from North America, 18% from Asia and 2% from South

America and 1% from Australia (Figure 6). It is evident from the sample that European firms are leading CE implementations followed by North America and Asia. There were 68 announcements involving a partnership (Figure 7) while the remaining 37 events did not (Figure 8).

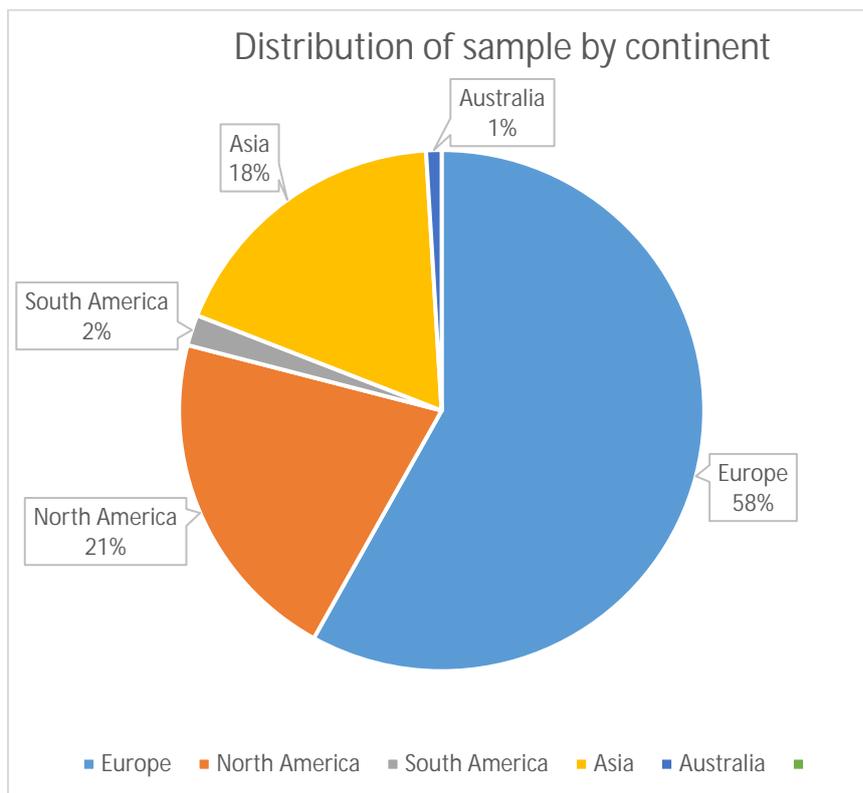


Figure 6: Distribution of sample

PR Newswire
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(PR) Enerkem partners with AkzoNobel to jointly explore development of waste-to-chemicals facilities in Europe

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MONTREAL, Nov. 12, 2014 /PRNewswire/ - Enerkem Inc. (www.enerkem.com), a waste-to-biofuels and chemicals producer, today announced it has signed an agreement with AkzoNobel, a leading global paints and coatings company and a major producer of specialty chemicals, to develop a project partnership to explore the development of waste-to-chemicals facilities in Europe.

"Enerkem's global expansion follows the launch of our waste-to-biofuels and chemicals full-scale commercial facility in Edmonton, which sent a strong signal that our technology is ready to be deployed around the world," said Vincent Chornet, President and CEO of Enerkem. "We are pleased to work with AkzoNobel to develop new facilities and products in Europe. With our lower-cost alternative to incineration and landfilling, we help chemical producers offer more sustainable products derived from waste and renewable sources rather than petroleum and we contribute to the transition to a circular economy."

"By making synthesis gas from waste, we will have a sustainable and cost-effective feedstock for the chemical industry which would be fully in line with our Planet Possible approach to sustainable manufacturing," explained Peter Nieuwenhuizen, AkzoNobel's Director of Innovation and Partnerships.

In this new project partnership, Enerkem will license its exclusive breakthrough technology to convert municipal and other waste feedstocks into chemicals. The final business structure and sites are under discussions and will be announced at a later time.

About Enerkem

Enerkem makes biofuels and renewable chemicals from waste. With its proprietary technology, Enerkem converts non-recyclable municipal solid waste into methanol, ethanol and other widely used chemical intermediates. Headquartered in Canada, Enerkem operates both a demonstration plant and a pilot facility in Quebec and is beginning operations at Enerkem Alberta Biofuels, its first full-scale commercial facility. The company is developing additional biorefineries in North America and globally, based on its modular manufacturing approach. Enerkem's technology and facilities help diversify the energy mix and make everyday products greener while offering a sustainable alternative to landfilling and incineration. www.enerkem.com

About AkzoNobel

AkzoNobel is a leading global paints and coatings company and a major producer of specialty chemicals. We supply industries and consumers worldwide with innovative products and are passionate about developing sustainable answers for our customers. Our portfolio includes well-known brands such as Dulux, Sikkens, International and Eka. Headquartered in Amsterdam, the Netherlands, we are consistently ranked as one of the leaders in the area of sustainability. With operations in more than 80 countries, our 50,000 people around the world are committed to delivering leading products and technologies to meet the growing demands of our fast-changing world.

SOURCE ENERKEM INC.

Figure 7: A sample announcement of CE initiative with partnership

Neste promotes circular economy and turns its focus on waste plastic

381 words

6 June 2017

Biofuels International Daily

BIOINTD

English

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Finnish advanced biofuels producer **Neste** is putting a large amount of resources into research on waste and residue raw materials and promoting the circular economy.

In addition to biofuels, also bioplastics can be produced from waste and residues in the future. The company is also focusing its raw materials research on waste plastics as a substitute for crude oil in the manufacture of oil products.

The idea of "one's waste is a valuable raw material to another" is central to the circular economy, and, for over a decade, it has inspired Neste's development and production of renewable fuels, according to the company.

The company already produces enough 'Neste MY Renewable Diesel' produced of waste and residues, to power more than two million cars for a year. According to the company, this will enable Neste's customers to reduce their greenhouse gas emissions by almost 7 million tonnes this year.

Underpinning this progress is the company's patented NEXBTL technology for refining low-quality waste fats into high-quality, fully renewable fuel. The same technology can be used to produce other renewable products also, such as renewable aviation fuel and raw material for bioplastics.

"In practice, our business, based on renewable products and circular economics, is eating away at our traditional business operations. This is a sacrifice that many did not believe in at first," said President and CEO of Neste, Matti Lievonen.

Lievonen added: "But when it comes to the question of what kind of planet we will leave to future generations, the transition to sustainable lifestyles cannot be held back."

Future raw materials

Fat-containing wastes and residues currently account for nearly 80% of the raw materials of Neste's renewable products. Examples of the raw materials Neste uses include waste fats from the meat and fish processing industries, and used cooking oil. However, the company said that the situation in a decade's time may be very different, as the waste and residues that are currently used by modern refineries are limited. Neste is investing a large amount of resources in research on renewable raw materials. The primary aim is to find increasingly lower grade waste and residue raw materials that have no other significant uses.

Figure 8: A sample announcement of CE initiative without partnership

5.5.2 Announcement categorisation

The final sample of 105 announcements were categorised into three capabilities - pollution prevention, product stewardship, and sustainable development, following Hart (1995) and Hart and Dowell's (2011) studies. A heuristic outlined in Figure 9 was followed in a stepwise manner to categorise announcements. First, the announcement was checked to see whether the firm focused on pollution prevention and reduction in its operations. If yes, the CE initiative was categorised as developing capabilities in pollution prevention. If not, the announcement was checked to see whether the firm intended to implement a take-back approach to reuse/recycle waste or to reduce the environmental impact along the supply

chain. If yes, the announcement was categorised as product stewardship as it focused on strategic capabilities at the supply chain level. If not, then the announcement was checked to see whether the firm innovated/used clean technology and/or low-impact product to achieve quantum-leap improvement in resource consumption. A quantum leap is a term used to define indefinite use of materials with minimum environmental impact. If yes, the CE initiative was categorised as developing capabilities in sustainable development due to its impact at the global/industry level. If not, the announcement was removed from the sample. Three researchers categorised the announcements independently. The inter-rater reliability was high ($r = 0.842$, $p < 0.000$). The researchers discussed differences in their categorisation results and eventually arrived at consensus. The categorisation process identified 6, 61 and 48 announcements developing strategic capabilities in pollution prevention, product stewardship, and sustainable development respectively.

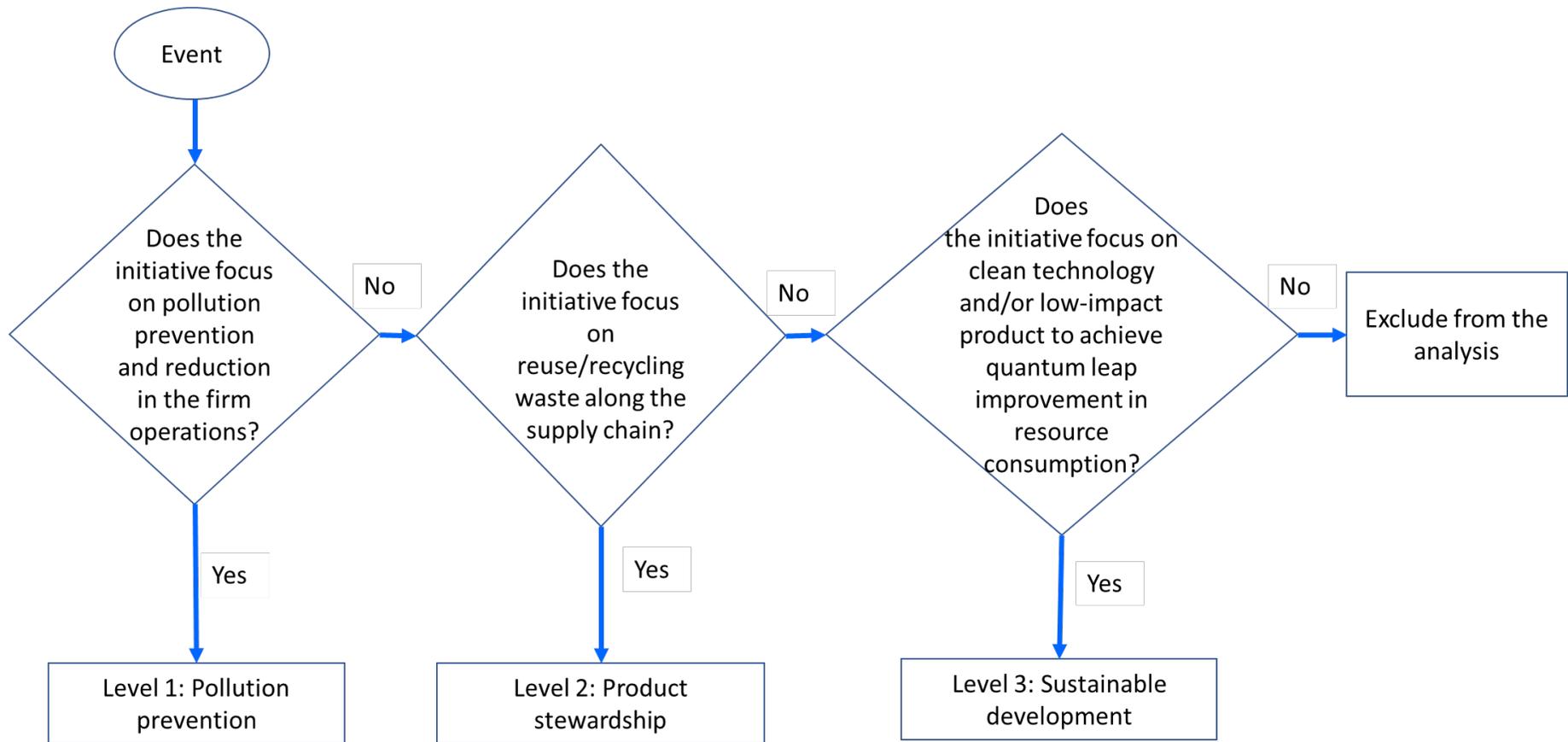


Figure 9: Categorisation of CE initiatives into three strategic capabilities

5.5.3 Calculation of cumulative average abnormal returns

Abnormal returns were calculated over a short event window as this maximised the ability to connect the event to the change in market value (McWilliams & Siegel, 1997). We found no evidence of information leakage and analysed abnormal returns on the event day (day 0). We used an estimation period of 250 trading days (-261 to -11), with a ten-day isolation period, as has been used in similar multi-country event-studies (Park, 2004; Wassmer & Dussauge, 2012). The ten-day interval shielded the expected returns from the effects of the announcement and took into account the non-stationarity of the estimates (Jacobs, Singhal, & Subramanian, 2010).

The measure of abnormal returns was based on the market model residual. The market model residual was calculated as the difference between the actual stock returns and expected stock returns on day t .

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

where R_{it} is the expected return of stock i on day t , R_{mt} is the stock market m return on the day t , α_i is the intercept of the relationship for stock i , and β_i is the slope of the relationship for a stock i with respect to the market return. The term $\beta_i R_{mt}$ is the portion of the rate of return on a market portfolio to stock. The error term ε_{it} for stock i on day t is the portion of the return that cannot be explained by market movements and therefore captures the change in market value related to the event. α_i and β_i was estimated using Ordinary Least Squares (OLS) regression over the 250-days estimation period from $t = -261$ to -11 days to calculate the expected stock returns (Jacobs, Singhal, & Subramanian, 2010; Park, 2004).

The average abnormal return for the day t is defined as:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \quad (2)$$

Abnormal returns in this study were calculated using local market indexes of the firms in their respective home countries. Rather than using a multi-factor model with a world stock market index (Park, 2004), we used the local market index as the approach is effective in detecting abnormal returns in multi-country event-studies that produces reasonable results (Campbell, Cowan, & Salotti, 2010; Lundgren & Olsson, 2010). Abnormal returns were aggregated across firms to calculate mean abnormal returns. The mean abnormal returns for all firms at day t was calculated as follows:

$$\overline{AR}_t = \frac{1}{N} \sum_{i=1}^N AR_{it} \quad (3)$$

Where N is the number of firms in the sample.

Cumulative abnormal returns (CARs) was calculated by summing up the abnormal returns in the event window (-1, 1) as follows:

$$CAR(-1, 1) = \sum_{i=-1}^1 \overline{AR}_t \quad (4)$$

5.5.4 Dependent variable

Cumulative abnormal returns (CARs) resulted from the sub-sample analysis of only partnership events was used as a dependent variable. Sub-sample analysis was performed to compare the extent of benefits of using partnership for CE initiatives with those that do not use partnership. Second, if using a partnership is beneficial, then the analysis was used to understand which firm-level factors may impact abnormal returns in partnership. Using a dummy variable in a complete sample of regression analysis can only demonstrate whether using partnerships influence CARs. However, it will not show the impact of firm-level factors on abnormal returns that result from initiating CE activities in partnership. The objective of this research was to estimate the impact of using partnership on CARs and what firm-level

factors increase/decrease CARs if a firm decides to enter a partnership for initiating CE activities.

5.5.5 Independent variables

This subsection explains how the six independent variables used in the hierarchical regression model were measured for testing the hypotheses.

Prior positive environmental performance (Pr_Pos_En_Per) was represented by a dummy variable that indicated whether a firm that announced a CE initiative had been included in the Dow Jones Sustainability Index (DJSI) in the year prior to the announcement (t-1). Firms included in the DJSI undergo a rigorous evaluation process, and membership is limited to the top 10% of companies listed on the Dow Jones Global Index (Cho, Guidry, Hageman, & Patten, 2012). Inclusion on the DJSI was taken as a measure of prior positive environmental performance (Cho et al., 2012). Pr_Pos_En_Per was coded 1 if the firm was included in the DJSI in the year (t-1) prior to the announcement, and 0 otherwise. A positive coefficient is predicted for Pr_Pos_En_Per.

Growth opportunities (Gr_Opp) were measured using the ratio of book value to market value (Fama & French, 1992). Market value is the stock price multiplied by the number of outstanding shares as reported ten days prior to the announcement date; book value is the asset value obtained for the fiscal year (t-1) prior to the announcement date (Hendricks & Singhal, 2003). DataStream is used for data collection. A negative coefficient is predicted for Gr_Opp.

Financial Slack (Fin_Slack) was measured as leverage, using the ratio of total debt to book value of total assets (Oliveira, Kadapakkam, & Beyhaghi, 2017). Total debt is the sum of short-term debt and long-term debt. All values were obtained for the fiscal year (t-1) prior to the announcement date. The data is collected from DataStream. There were three instances

where data for total debt was missing. For missing values, annual reports and balance sheets were searched to find the necessary values for computation. A negative coefficient is predicted for Fin_Slack.

5.5.6 Control variables

This study controlled for four variables which were expected to influence the stock market reaction. The first control variable is firm size (Firm_Size). Previous event studies reported that stock market reaction is affected by firm size (Jeong, Jeong, Lee, & Bae, 2018; Kim, Wagner, & Colicchia, 2019). With more societal visibility, larger firms face stronger pressure from the external stakeholders to adopt proactive environmental practices, for example, CE practices, than smaller firms. Additionally, larger firms have more internal resources available to carry out CE initiatives than smaller firms (Li, Jayaraman, Paulraj, & Shang, 2016). Firm size was assessed by the total revenue of the firm as reported in the fiscal year (t-1) prior to the announcement date (Shankar, 1999), as reported on DataStream. This measure is natural log-transformed to normalise it (Dekimpe, Francois, Gopalakrishna, Lilien, & Van den Bulte, 1997). There were two negative revenues (calculated as the difference between actual revenue plus total costs minus projected revenue) in the dataset. The following method, proposed by Ljungqvist and Wilhelm (2005) was used to natural log-transform negative total revenues.

Total revenue = $\ln(0.01 + \text{total revenue})$ if total revenue > 0 , and Total revenue = $-\ln(0.01 - \text{total revenue})$ if total revenue < 0

The second control variable is firm age (Firm_Age), measured as the time elapsed from the date of firm establishment and the time of the announcement (Kalaignanam, Shankar, & Varadarajan, 2007). Data on firm age was collected from websites and the annual reports for firm age. Prior studies have shown that firm age has an impact on stock market reaction, because young firms lack resources compared to old firms. Young firms are also under

increasing pressure to survive and need to be proactive in adopting environmental practises, such as initiating CE practises to show their legitimacy (Dangelico, Pujari, & Pontrandolfo, 2017; Darnall, Henriques, & Sadosky, 2010).

The third control variable is type of industry (Env_Reg) based on SIC codes. Some industries face more stringent environmental regulations and have to be more proactive in environmental management to improve their social image and legitimacy (Cho & Patten, 2007). Those industries are chemicals (SIC 28xx), metals (SIC 33xx), paper (SIC 26xx) and petroleum (SIC 2911) (Sadovnikova & Pujari, 2017). A dummy variable was coded as 1 if the announcing firm belongs to any of those industries, 0 otherwise.

The last control variable is multiple CE initiatives (Multiple) that control for potential differences in investor reaction to the multiple announcements of the same firm. This may influence the stock market reaction as it builds positive social image and conveys the message that the firm is environmentally responsible. Multiple initiatives may increase the likelihood of a successful CE implementation as a result of increased experiences and learning. The sample collected for this study was used to count the number of CE initiatives. Following Daly, Pouder, and McNeil (2017), a dummy variable was coded as 1 if the firm had multiple announcements, 0 otherwise.

5.5.7 Descriptive statistics of the variables

Table 15 presents the descriptive statistics of independent and control variables used in the regression. 68 out of 105 observations of CE initiatives in partnership were used in the regression analysis. This subsample consisted of a range of firm sizes measured as annual revenue. The minimum and maximum revenues were -2.23 and 71650.11 million US\$ respectively. The natural log-transformed values of firm size were used in the regression analysis. The median book-to-market ratio was 2.29, and the minimum value was 0.46. The

minimum and maximum value of the financial slack was 0.00035 and 0.62 respectively. The average age of the firms was 61 years. The sample showed the range of strategic capabilities including pollution prevention, product stewardship, and sustainable development. There were 22 announcements when the respective firms were listed on DJSI in (t-1) year prior to the announcement date. 28 announcements were related to firms operating in industries that required strict environmental control. 33 firms announced multiple CE initiatives in partnership. Table 16 presents the Pearson correlations table between dependent, independent, and control variables used in the hierarchical regression model.

Table 15: Descriptive statistics of the variables

	Number	Mean	Median	S.D.	Minimum	Maximum
Annual revenue (US\$ millions)		18744.96	9806.97	21231.13	-2.23	71650.11
Market-to-book ratio		3.07	2.29	2.77	0.46	14.91
Financial slack		0.27	0.28	0.14	0.00	0.62
Firm age (Years)		61.00	65.00	47.68	1.00	165.00
Number of announcements when the respective firms were listed on DJSI in (t-1) year prior to the announcements	22.00	0.32	0.00	0.47	0.00	1.00
Number of announcements of the firms belonged to industries that require stringent environmental control	28.00	0.41	0.00	0.49	0.00	1.00
Number of firms that had multiple CE initiatives	33.00	0.79	0.00	0.50	0.00	1.00

Table 16: Pearson correlation between dependent, independent and control variables used in the hierarchical regression

	1	2	3	4	5	6	7	8
	CAAR (-1, +1)	Firm_Age	Firm_Size	Env_Reg	Multiple	Gr_Opp	Fin_Slack	Pr_Pos_En_Per
1	1							
2	-0.089 (0.470)	1						
3	-0.316*** (0.009)	0.318*** (0.008)	1					
4	0.018 (0.883)	-0.104 (0.401)	-0.027 (0.829)	1				
5	0.061 (0.620)	-0.098 (0.425)	-0.021 (0.100)	0.324*** (0.007)	1			
6	-0.109 (0.376)	-0.063 (0.609)	-0.143 (0.243)	0.005 (0.971)	-0.009 (0.942)	1		
7	-0.359*** (0.003)	0.032 (0.797)	0.435*** (0.000)	-0.074 (0.549)	-0.237* (0.052)	0.047 (0.706)	1	
8	0.172 (0.161)	0.384*** (0.001)	0.306** (0.011)	0.060 (0.626)	0.020 (0.869)	-0.105 (0.393)	0.179 (0.145)	1
Mean	1.006	61.014	14.623	0.411	0.485	3.078	0.272	0.323
SD	3.534	47.625	4.848	0.496	0.503	2.765	0.139	0.471

Note: Firm size is log-transformed. Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level

5.6 Results

5.6.1 Event study analysis results

Table 17 shows the event study results based on the full sample using the multi-country market model. There is a positive stock market reaction to the announcements of CE initiatives in a three-day (-1, +1) event window. The cumulative average abnormal returns (CAARs) is 0.59%, which is significant for t-test cross-sectional at 5%, Patell Z at 10% and the sign test at 10%. The results support H1.

Table 17: Event study results based on the full sample

Period	n	Mean	Median	% Positive	t-test Cross- sectional	Patell Z	t-BMP	Corrado Rank	Sign test
-3	105	-0.08%	-0.06%	44.76%	-0.6165	-0.8715	-0.7246	-0.8128	-0.9860
-2	105	0.05%	-0.11%	46.66%	0.3149	-0.1936	0.2006	-0.2229	-0.5957
-1	105	0.14%	-0.01%	49.52%	0.9737	0.8054	0.7507	0.5854	-0.0101
0	105	0.33%	0.20%	57.14%	2.0234**	2.1943**	1.8773*	2.1406**	1.5514
1	105	0.11%	-0.04%	49.52%	0.5221	0.0987	0.0753	-0.3663	-0.0101
(0, +1)	105	0.45%	0.13%	56.19%	1.7253*	1.6200	1.2793	1.2546	1.3562
(-1, 0)	105	0.47%	0.14%	59.04%	1.9658**	2.1197**	1.7465*	1.9270*	1.9418*
(-1, +1)	105	0.59%	0.23%	58.09%	2.1209**	1.7877*	1.3737	1.3619	1.7466*

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level

An independent sample t-test was chosen over a regression analysis to compare the means of CARs resulted from implementing different CE strategies. Because regression analysis using dummy variables to compare the effect of variables against the variable of interest delivers similar results for the same sample size (Bordacconi & Larsen, 2014). While regression analysis determines if the model is significantly different from the mean, an independent sample t-test determines if the means are significantly different (Bordacconi & Larsen, 2014). The independent sample t-test shows insignificant difference in the CAARs of CE initiatives focusing on pollution prevention (M = -0.15%, SD = 2.05%) and product stewardship (M = 0.52%, SD = 3.22%); $t(7.69) = -0.727, p = 0.24$ (one-tailed test). H2a is not supported. A same test shows insignificant difference on the CAARs of CE initiatives focusing on product stewardship (M = 0.52%, SD = 3.22%) and sustainable development (M = 0.80%, SD = 2.93%); $t(84.35) = -0.435, p = 0.33$ (one-tailed test). Hypothesis 2b is not supported. Similarly, there is insignificant difference in the CAARs of CE initiatives focusing on pollution prevention (M = -0.15%, SD = 2.05%) and sustainable development (M = 0.80%, SD = 2.93%); $t(8.62) = 0.990, p = 0.17$ (one-tailed test). Hypothesis 2c is not supported. Overall, a greater coefficient is observed for a higher-level strategic capability, but the differences were not statistically significant. Therefore, it is inconclusive whether CE initiatives focusing on a higher-level strategic capability achieve better financial performance.

Table 18 and 19 demonstrate the event study results based on the sub-sample of announcements of CE initiatives in partnership using the market model and mean-adjusted model. There is a positive stock market reaction to the announcements of partnership in a three-day (-1, +1) event window. For the market model, the mean CAARs is 1.01%, which is significant for t-test cross-sectional at 5%, Patell Z at 1%, t-BMP at 10%, Corrado rank at 5% and Sign test at 5%. The results are consistent for mean-adjusted model.

Table 18: Abnormal returns for the three-day event window (-1, +1) using two different market models

Model	n	Mean CAR	%Positive	Cross-sectional t	Patell Z	t-BMP	Corrado Rank	Sign Test
Multi-country Market model	68	1.01%	64.70%	2.3473**	2.7795***	1.9593*	2.1033**	2.5513**
Mean-adjusted model	68	1.02%	69.10%	2.1816**	2.7252***	2.2050**	1.8860*	2.0375**

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level.

Table 19: Event study results of the analysis of announcements of partnership for CE initiatives

Period	n	Mean	Median	% Positive	t-test Cross-sectional	Patell Z	t-BMP	Corrado Rank	Sign test
-3	68	-0.05%	-0.05%	45.58%	-0.2484	0.6094	0.4763	-0.5165	-0.6021
-2	68	-0.04%	-0.18%	44.11%	-0.2062	-0.6184	-0.6287	-0.8492	-0.8446
-1	68	0.33%	0.14%	55.88%	1.6870*	1.7535*	1.5146	1.7423*	1.0959
0	68	0.43%	0.23%	54.44%	1.7959*	2.2645**	1.7252*	1.8175*	0.8553
1	68	0.23%	-0.00%	50.00%	0.6953	0.7962	0.5526	0.0834	0.1256
(0, +1)	68	0.69%	-0.20%	58.82%	1.7413*	2.1643**	1.4550	1.3441	1.5810
(-1, 0)	68	0.77%	0.44%	63.23%	2.4246**	2.8412***	2.135**	2.5171**	2.3087**
(-1, +1)	68	1.01%	0.55%	64.70%	2.3473**	2.7795***	1.9593*	2.1033**	2.5513**

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level.

Table 20 demonstrates the results of a sub-sample event study for the announcements of CE initiatives without partnership. The results show a negative stock market reaction in a three-day (-1, +1) event window. The mean CAARs is -0.19%, which is insignificant for all parametric and non-parametric tests. An independent sample t-test confirms a significant difference in CAARs for CE initiatives in partnership (M = 1.01%, SD = 3.5%) and CE initiatives without partnership (M = -0.19%, SD = 1.6%); $t(103) = 1.396$, $p = 0.01$ (one-tailed test). The results support hypothesis H3.

Table 20: Event study results of announcements of CE initiatives without partnership

Period	n	Mean	Median	% Positive	t-test Cross- sectional	Patell Z	t-BMP	Corrado Rank	Sign test
-3	37	-0.15%	-0.06%	45.24%	-0.9904	-0.6419	-0.7385	-0.7078	-0.8489
-2	37	0.20%	-0.02%	51.35%	1.1704	-1.1604	1.4347	-0.8351	0.1415
-1	37	-0.23%	-0.31%	37.83%	1.6800*	-1.0245	-1.5569	-1.4853	-1.5025
0	37	0.14%	0.15%	62.16%	1.0862	0.6232	1.0371	1.1191	1.4567
1	37	0.09%	-0.06%	48.64%	-0.5491	-0.9132	-1.1475	-0.7789	-0.1873
(0, +1)	37	0.45%	-0.12%	48.64%	0.2168	-0.2051	-0.2873	0.2971	-0.1415
(-1, 0)	37	-0.09%	-0.06%	48.64%	-0.4838	-0.2809	-0.4087	-0.2024	-0.1415
(-1, +1)	37	-0.19%	-0.13%	45.94%	-0.6828	-0.7556	-1.0046	-0.6149	-0.5161

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level

5.6.2 Regression results

The following regression model is developed to measure the CAARs when firms announced CE initiatives in partnership. The CAARs were measured over the three days even window (-1, +1) calculated using the market model in multi-country settings.

$$\begin{aligned}
 CAAR_{i(a_1, a_2)} = & \beta_0 + \beta_1 Firm_Age + \beta_2 \ln(Firm_Size) + \beta_3 Environ_Reg \quad (5) \\
 & + \beta_4 Multiple + \beta_5 Pr_Pos_En_Per + \beta_6 Gr_Opp \\
 & + \beta_7 Fin_Slack + \varepsilon_i
 \end{aligned}$$

Hypotheses H4-H6 were tested by following a hierarchical regression framework. Two regression models are presented in Table 21. Model 1 estimates the effect of control variables on abnormal return without including independent variables. Model 2 includes independent variables to estimate the combined effect of independent and control variables on the abnormal returns. As the variance influence factor (VIF) for all variables in Model 2 is less than 5.0, multicollinearity is not a concern (Cohen, Cohen, West, & Aiken, 2003). The non-constant variance score revealed that heteroscedasticity was present (Chisquare = 10.497, df = 1, p-value = 0.00) (Cook & Weisberg, 1983). Following White (1982), this research used robust standard errors as the heteroscedasticity covariance matrix (HC) estimators are appropriate

for this case. Being a small sample, we used the HC1 estimator (Kleiber & Zeileis, 2008). An analysis of hat-values determines the presence of influential observations (Fox & Weisberg, 2018). However, all values are less than 0.50 (Appendix 1). We decided to include these observations in the dataset as removing them from the regression would result in a reduced sample size and could induce additional bias in the estimation. According to the formula given by Cohen (2013), the effect size and statistical power of the regression analysis was also proved to be adequate (Appendix 2).

The results in Table 21 show support for H5, confirming that low growth firms that announced CE initiatives in partnership experienced a more positive stock market reaction. H6 is supported, suggesting more financial slack are associated with the more positive stock market reaction for announcements of CE initiatives in partnership. However, there is no evidence to support H4 as the coefficient between prior positive environmental performance and the CAAR is negative and insignificant.

Table 21. Results of hierarchical regression (n= 68)

Independent Variables		Model 1		Model 2		VIF
		Coefficient	Std. Error	Coefficient	Std. Error	Model 2
Intercept		4.3518**	1.9957	5.8241***	3.4510	
Firm_Age	Control	0.0010	0.0093	0.0100	0.0098	1.2963
Firm_Size	Control	-0.2341**	0.1173	-0.1525	0.1035	1.4809
Environ_Reg	Control	0.0920	0.8702	-0.0935	0.8532	1.1379
Multiple	Control	-0.0439	0.9050	-0.3002	0.8772	1.2053
Pr_Pos_En_Per	H4			-0.5811	0.7805	1.2755
Gr_Opp	H5			-0.1722*	0.1099	1.0427
Fin_Slack	H6			-6.5296**	3.1926	1.3354
F		1.7520		1.9270		
Significance		0.1497		0.0808		
Observed R ²		0.1001		0.1836		
Adj. R ²		0.0429		0.0883		

Significance levels (one-tailed tests): * 10% level, **5% level, *** 1% level

5.7 Discussion

5.7.1 Theoretical implications

Using the NRBV and the relational view as theoretical lenses, the present study analyses the stock market reaction of firm announcements on CE initiatives by following the short-term event study methodology. Based on a sample of 105 announcements of CE initiatives during the 2009-2018, the CAARs was 0.59% in the event window (-1, +1) and the positive impact on financial performance was statistically significant (H1 supported). The magnitude of the effect is greater than that of green supply chain practices, which was 0.37% in the same event window following a same event study methodology (Bose & Pal, 2012). Furthermore, Zhu and Sarkis (2004) and Green, Zelbst, Meacham, and Bhadauria (2012) found that green supply chain practices improved economic and financial performance among the surveyed manufacturers in China and the US respectively. This study, along with these relevant studies, affirms the explanatory power of the NRBV in the role of sustainability capabilities for achieving a competitive advantage.

As to whether CE initiatives focusing on a higher-level strategic capability achieve better financial performance, the results are inconclusive (H2a, H2b and H2c are all not supported). Although a larger coefficient was observed for a higher-level strategic capability, the differences were not statistically significant among the comparisons made between pollution prevention, product stewardship and sustainable development. Kurapatskie and Darnall (2013) assessed the economic relationship between lower- and higher-order sustainability activities. They found higher-order sustainability activities (which develop new products and processes) generated greater financial benefits than lower-order sustainability activities (which modify existing products and processes). They used self-reported sustainability reports to extract data on financial benefits and they suspected that self-reported data may be biased. This research investigated different variables but shared the same interest in

understanding the performance outcome of sustainability capabilities/activities at different levels. Although our research finding is inconclusive, it adds value by using stock market data which is more objective than self-reported financial data. There is a need to conduct further studies with larger sample sizes.

Partnership is found to have a very positive and significant effect on the performance outcome of CE initiatives (H3 supported). The CAARs associated with CE announcements with and without partnership were 1.01% and -0.19% respectively, and the difference was statistically significant. The finding is consistent with the recent studies on the effect of sustainability practices that collaborative inter-firm relationships are beneficial to financial performance (Choi & Hwang, 2015) and environmental management capabilities (Lee & Klassen, 2008).

Using the sub-sample of 68 announcements of CE initiatives in partnership, this study tested the influence of three independent variables, namely, prior positive environmental performance, growth opportunities and financial slack. The impact of prior positive environmental performance on the CAARs of the announcing firms was negative and insignificant (H4 not supported). The finding of a negative coefficient is in line with the results of prior short-term event studies that also used DJSI inclusion as a proxy of prior positive environmental performance (López, Garcia, & Rodriguez, 2007; Oberndorfer, Schmidt, Wagner, & Ziegler, 2013). Although Hart (1995) and Hart and Dowell (2011) believed that social legitimacy improves competitive advantage leading to improved financial performance, the present study has found no support for this claim. On the contrary, investors appeared to be sceptical of the economic benefits of an inclusion in the DJSI, penalising DJSI listed firms at least in the short term. A possible explanation is that inclusion in the DJSI is considered non-productive as it requires firms to be involved in various environmental and social activities

which are not directly related to creating business value (López et al., 2007; Oberhofer & Dieplinger, 2014).

The effect of growth opportunities was found to be negative (H5 supported). It implies that the firms having low growth opportunities derive more financial benefits from initiating CE practices in partnership than those having high growth opportunities. The finding is similar to that of Bose and Pal (2012) who examined the effect of growth potential on the market value of the firms that have initiated green practices. As explained in the hypothesis development section, the key reason for this phenomenon is that unexpected announcements have a greater likelihood of influencing stock market reaction than expected announcements (Bose & Pal, 2012).

As expected, financial slack measured as leverage was found to have a negative and significant effect on financial performance (H6 supported). The finding affirms the relevance of the NRBV in explaining the effect of CE initiatives in partnership.

The findings reveal a link between the NRBV and the relational view of the firm. Managing environmental sustainability is a challenging task that demands close interaction between firms, customers and other external stakeholders. Theoretically, resource dependence contributes to the formation of a strong bond among collaborating firms as a result of long-term interactions. Partnership for CE initiatives is an effective approach to address complex environmental challenges without sacrificing economic benefits. CE practices require firms to share knowledge and collaborate in processes to effectively use waste as resources, to reduce their reliance on virgin natural resources. Over time, their combined capabilities will expand and become causally ambiguous, socially complex, and firm-specific, leading to a gain in competitive advantage as consistent with the NRBV. Researchers have emphasised the significance of the relational view in understanding specific objectives, for example, flexibility,

cost reduction, efficiency, quality, and innovation performance (Vachon & Klassen, 2008). The present research extends the boundary of the relational view to consider sustainable development as a relatively new objective.

There are two unexpected findings. The NRBV theorised three levels of strategic capabilities for improving environmental sustainably, namely, pollution prevention, product stewardship, and sustainable development (from a lower to a higher level) (Hart, 1995). Although the coefficients of their impact on financial performance were found to be in an increasing order, the differences were not statistically significant. Further investigations were required to draw a conclusion on the performance outcome of strategic capabilities at different levels. The other surprising finding is on the role of firm reputation and its effect on financial performance. Hart (1995) argued that a positive environmental reputation could help firms gain a competitive advantage. However, his argument was not supported by the study's results. In contrast, this research shows that the stock market is sensitive to spending that does not directly add economic value and penalises firms for that behaviour, in particular, an inclusion in the DJSI.

5.7.2 Managerial implications

This study provides several implications for practice. First, it provides empirical evidence that CE initiatives can be good for business, and their benefits to financial performance (CAAR: 0.59%) are generally expected to be greater than those from green supply chain practices (CAAR: 0.37%). There has been scepticism on the financial performance of CE initiatives. This study provides timely assurance to businesses of the positive effect of CE initiatives on financial performance, at least from the investors' viewpoint. Therefore, business managers should embrace the CE concept without hesitation due to its dual benefits on environmental and financial performance.

Second, CE initiatives that involve partners are far more effective than those without partners, in terms of financial performance (CAAR: 1.01% vs -0.19%). Managers should thus be aware that partnerships are vital for CE initiatives, and should actively pursue collaborations with supply chain partners, especially with those who have complementary capabilities and can exchange resources for value recovery. A firm may need to engage a range of partners depending on the materials used because different materials may require different processes and expertise for value recovery. Partnership is especially important for firms with low growth opportunities for two reasons: they lack financial resources to implement innovative sustainability practices alone, and CE partnerships have a very significant effect on financial performance.

Last, the research findings shed light on the use of financial resources. This study confirms that high financial slack or low leverage improves the financial performance of firms that initiate CE practices in partnership. This means financial resources are required for CE implementation and they play an important role in affecting the performance outcome. Nevertheless, businesses need to exercise great caution on spending funds on reputation building, such as inclusion on sustainability indexes. It is likely to be more profitable to invest financial resources in improving operations capabilities in CE.

5.8 Conclusion

There has been increasing interest in the CE concept for improving environmental sustainability, both in academia and the government and business sectors across the globe. Motivated by the phenomenon, this study investigates the impact of CE initiatives on financial performance, the role of partnership and its influencing factors including prior positive environmental performance, growth opportunities, and financial slack. Six hypotheses were

developed based on two theoretical lenses: the NRBV and the relational view of the firm. They were tested with a short-term event study using secondary data.

This study makes several original contributions. First, it pioneers the use of event studies to assess the financial impact of CE initiatives. Given the importance of the CE concept for environmental sustainability, the study makes an important contribution to provide timely assurance to those who are sceptical about its financial performance. The study results also show that CE activities have more positive impact on financial performance than green supply chain activities as the former integrates a new and innovative circular thinking. Second, partnerships were found to play an important role in raising the impact of CE initiatives on financial performance. The finding highlights the importance of partnership to facilitate circular material flows for reuse/recycling to reduce reliance on virgin raw materials for improving both environmental and financial performance. Third, the financial performance of CE partnership is influenced by several factors. A more positive stock market reaction was observed for the firms that have more financial slack and low growth opportunities, but not on those that have prior positive environmental performance measured by an inclusion in the DJSI. The finding suggests that CE initiatives require financial resources, but firms need to use them with caution, focusing on activities that directly contribute to economic value instead of reputation building. Last, the research findings provide support to most of the key propositions of the NRBV and relational view. Although the results are inconclusive, this study made a first attempt to examine whether the three levels of strategic capacities (pollution prevention, product stewardship, and sustainable development) theorised in the NRBV have different performance outcomes. The method of analysis offers guidance to further studies.

This study has several limitations. First, the research sample includes 105 announcements of CE initiatives. The subsample of CE initiatives with partnership consists of 68

announcements. Although the sample sizes were justified for the required analyses, future studies could compare the results of this study with a larger sample size after more relevant announcements have been made in the future. Such studies will be especially important for drawing a conclusion on the financial performance of different levels of strategic capabilities in environmental sustainability. Second, the analysis of this study is based on multi-country settings. The environmental regulations of different countries may cause different motivation for CE initiatives, and consequently, different effects on financial performance. Future studies may analyse the impact of CE initiatives in a specific country. Third, this study has considered partnership as a holistic mechanism without differentiating between collaboration, strategic alliances, or joint ventures. Future studies might use primary data, for example, survey data, to analyse how different partnership mechanisms affect financial, operational and environmental performances. Fourth, this study used DJSI inclusion as a proxy for prior positive environmental performance without separating individual scores of environmental and social performances, so the results might be biased. Future studies could analyse the effect of individual scores of prior positive/negative environmental and social performances on the financial performance of CE initiatives in partnership.

Appendix 1: An analysis of hat-values

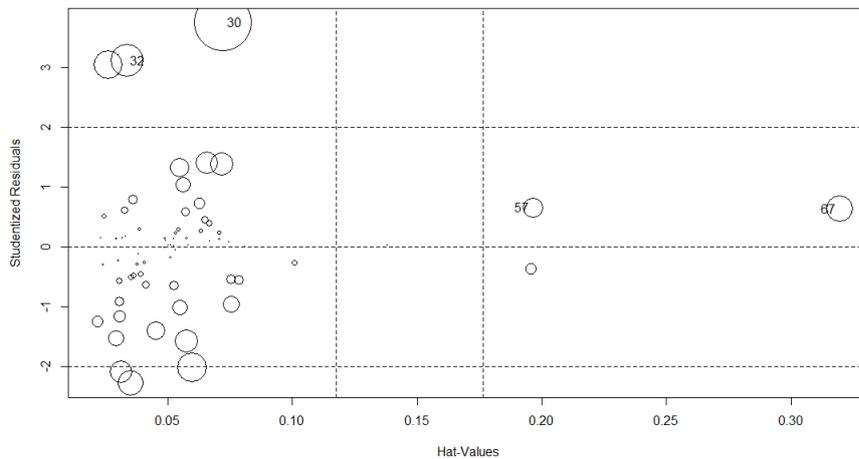


Figure 10: Hat values

Note: Influential plot with the dashed vertical line shown in the figure is at the two times and three times the average hat-value. Some observations are more than three times the average hat-value but within the acceptable limit of 0.5. The circle size shown is proportional to Cook's distance.

Appendix 2: Validation of effect size and statistical power for the regression analysis

This appendix calculates the effect size and the statistical power to understand the magnitude of difference between variables resulted from the hierarchical regression analysis. A small subsample size of this analysis (68 observations) might be a concern for the relevance of hierarchical regression results. However, if the effect size is large enough, it is possible to detect a statistically significant difference (Cohen, 2013). Conversely, it is possible that a large sample size may detect a difference that is very small and trivial, inadequate to provide significance to the results. Cohen (2013) suggested reporting both the effect size and the statistical significance is essential to fully understand the results.

Using Cohen's (2013) formula provided below as equation (6), the effect size of the independent variables of our hierarchical regression model is 0.18.

$$f^2 = \frac{R^2}{1 - R^2} \quad (6)$$

Where R^2 is observed R^2 value, obtained from the hierarchical regression results. Cohen (2013) defined the effect size values near 0.02 as small, near 0.15 as medium, and above 0.35 as large. Based on Cohen's (2013) definition, the effect size of our regression model is medium.

Statistical power is the probability of hierarchical regression analysis that reveals a statistically significant difference between variables when an actual difference between them does exist. If statistical power is high, the probability of determining the difference between variables is also high (Sullivan & Feinn, 2012). Statistical power is calculated as $1 - \beta$, where β is the probability of accepting a false null hypothesis. The statistical power of this analysis is calculated as 0.827, higher than the threshold value of 0.80 as suggested by Cohen (2013).

The above analysis confirms that 68 is an adequate sample size with a medium value of effect size and acceptable statistical power for the present regression analysis. The results provide relevance to predict the relationship between the dependent and independent variables with high certainty.

Chapter 6 Manuscript 3: Social sustainability

Title: The impact of social initiatives on firm market value.

Preface

The two previous manuscripts examined the effect of partnership for improving economic and environmental sustainability in the supply chain. Another important issue is social sustainability. Firms have started to recognise the importance of including society and its issues in the business decision process (Rodríguez, Thomsen, Arenas, & Pagell, 2016). However, firms often lack resources, knowledge, and skills to address social issues (Balaisyte, Besiou, & Wassenhove, 2017). Partnership with NGOs and institutional organisations is an appropriate approach to address social issues as these firms have specific knowledge, skills, and resources (Johnson et al., 2018). The focal firms need access to these resources to fulfil their social sustainability goals. Social sustainability, an important aspect of the supply chain not adequately addressed in the literature, is the topic of Manuscript 3. The idea behind including social sustainability in the thesis is to cover all three pillars of sustainability and analyse the effect of partnership for initiating social activities on financial performance and what factors influence it. This study used an event study methodology and answered the third sub-research question.

6.1 Introduction

Organisational sustainability refers to an organisation's ability to survive over the long term and can be assessed from three perspectives: economic, environmental and social (Lozano, 2008). While the former two are well-established research topics, the latter is less so (Kumar & Anbanandam, 2019; Mani et al., 2015a; Bai et al., 2019; Govindan et al., 2014). Social sustainability is grounded in the understanding that organisations are open systems, influenced by their environment and in turn able to modify it (Scott, 1987). An organisation's operating environment provides both opportunities and constraints (Aldrich, 2008), and to

remain viable, organisations need to look beyond their organisational boundaries and consider the welfare not only of their employees but of other individual stakeholders in society who can affect or be affected by the organisations' business processes (Phillips, 2003).

For example, if the community in which an organisation is located lacks good educational or healthcare facilities, the organisation may not be able to hire skilled or healthy employees. Even if it does so, the employees may be worried about their families' welfare and may decide to move to other locations with better health and educational facilities, thus affecting the organisation's economic performance. Similarly, if organisations located in communities that suffer from severe floods or storms do not participate in relief efforts, their reputation may suffer, deterring potential recruits or motivate government agencies to reduce their support.

The two examples above indicate the value of focusing on social sustainability for organisations. Broadly, organisations need to ensure that the individuals living in their community are not subject to conditions that systematically deteriorate their abilities to satisfy their needs and desires, because such deterioration in their quality of life can have a negative impact on the organisations' own economic performance (Hart et al., 2003). Examples of social sustainability practices include improving labour conditions and wages or helping communities during natural or man-made disasters and emergencies.

Social sustainability incorporates concepts such as "equity, empowerment, accessibility, participation, sharing, cultural identity, and institutional stability" (Basiago, 1998, p. 149). Social challenges, such as hunger, poverty, natural disasters, the use of child labour, and workplace safety, affect social sustainability negatively (Nationen, 2013; Mani, Agarwal, et al., 2016). While there have been historical examples of organisations that have engaged in social

sustainability practices in various countries¹, this issue is increasingly important because it is confined not just to individual organisations or supply chains but becoming a global problem (United Nations, 2019).

Firms initiate social sustainability-related activities for a few reasons: as part of their organisational strategy (Erhemjamts et al., 2013), to comply with regulations, in response to pressure from stakeholders and consumers, or to improve their reputation (McWilliams, 2015; Windolph et al., 2014; Zheng et al., 2015), with the last often being the most prominent reason (de Lange et al., 2012). However, the involvement of firms in social sustainability activities remains limited. While meta-analytic reviews have established a positive relationship between social sustainability activities and financial performance (Wang, Dou, & Jia, 2016; Orlitzky, Schmidt, & Rynes, 2003), events, such as violating labour laws by paying employees less than minimum wages (Graafland, 2002), the 2010 explosion of British Petroleum's Deepwater Horizon oil rig (Elliot, 2015), and the 2019 lawsuit alleging that large global technology firms were complicit in child labour practices (Kelly, 2019), raise doubts as to whether firms are aware of this link or if it exists. If they were, they would be more likely to act in a socially-responsible manner and not engage in actions that damage the societies they operate in. Alternatively, if firms perceived that there was a negative, or no relationship, between socially-responsible actions and their financial performance, they would most likely be indifferent to addressing social challenges, or only carry out the minimum amount to maintain their reputation and legitimacy, and avoid legal penalties (Cordeiro & Tewari, 2015).

¹ Examples of nineteenth-century businesspeople in the United Kingdom whose firms engaged in socially-responsible activities include Robert Owen, George Cadbury, Titus Salt and Joseph Rowntree (page xiii: By & Burnes, 2013).

Thus, this study's objective is to address this conundrum: if firms can enhance their viability by carrying out socially-responsible actions, why are such actions relatively uncommon? We frame socially-responsible actions as signals, with the content of these signals informing the public that the firms carrying out such actions are aware that such actions affect their long-term viability, both directly (for example, rebuilding roads after floods helps local residents as well as firms because they can restart deliveries of their goods) and indirectly (for example, by enhancing their reputation). The credibility of such signals depends on the resources of the firm carrying out the socially-responsible actions: does it possess the resources required to accomplish them or does it need the help of partners? Also, the credibility of the signals depends on the type of socially-responsible actions being carried out: are they relevant to the local or national context, by complementing or supplementing government efforts, or are they closely-connected to local needs?

To meet its objective, this study uses the event study methodology to analyse the impact of social initiatives carried out by firms on changes in their market value. The event study methodology is appropriate here because current metrics for measuring socially-responsible activities carried out by firms are relatively diffuse. Third-party ratings, such as the Kinder, Lydenberg, Domini Research & Analytics (KLD) and Dow Jones Sustainability Index (DJSI), which have been used to measure the impact of corporate social performance on financial performance (Orlitzky et al., 2003; Wang et al., 2016), are problematic because they conflate economic, environmental, and social activities (Becchetti et al., 2012; Cordeiro & Tewari, 2015; Hawn et al., 2018; López et al., 2007). Lourenco et al. (2014) points out in the case of DJSI ratings that: "the emphasis on economic factors to the detriment of either social or environmental factors is difficult to reconcile with the definition of sustainable development" (p. 5). In addition, there is concern that the KLD and DJSI ratings may be unduly influenced by

firms' voluntary disclosure policy (Cho et al., 2012). Other researchers have used corporate philanthropy as a proxy for social performance (Gao et al., 2012; Muller & Kräussl, 2011; Patten, 2008). However, such activities capture only one aspect of firms' social performance, as they do not include broader socially-responsible actions, such as offering a "living wage", promoting gender equity, or supporting wounded or disabled military veterans.

The present study overcomes the above concerns by recording discrete news events that indicate the different types of corporate social activity, before then analysing the impact of corporate social activity on firm financial performance using the event study method. In addition, this is the first study that analyses the combined effect of social initiatives on the change in the market value of firms. Using a sample of 765 observations of social initiatives by firms listed in the United States, the results showed that investors did not react to the social initiatives firms initiated. Further analysis examined whether investor reaction differed by the type of activity, the presence of partners, and firm-level differences in terms of growth opportunities, financial slack, and visibility.

The results complement the literature in several respects. First, they support prior studies which reported no relationship between social performance and financial performance (Bird et al., 2012; Cheung, 2011; Jacobs et al., 2010; Schröder, 2007). Second, this study suggests that since social activities do not influence financial performance, firms should pursue them for ethical or altruistic reasons and be accountable for their social initiatives. Third, this study provides new insights about what kind of social issues should be prioritised, whether firms should improve their visibility by initiating more social activities, and whether high growth firms should initiate social activities. These results also have important managerial implications. First, managers should be cautious when investing in multiple social initiatives to improve their firm's visibility and enhance its reputation and legitimacy. Second, firms that

are growing quickly may derive more financial benefits if they target their investments on social issues, such as hunger prevention. By understanding how investors react to corporate social initiatives, these findings make it easier for managers to determine the optimal mix of social activities their firms should engage in.

The remainder of this article is structured as follows. Section 2 reviews the literature, explains the theoretical lenses used in this study, and develops the hypotheses to be tested. The sample formation, methodology, description of the data, and variables for event study and regression analysis are discussed in Section 3. Section 4 presents the results of the event study and regression analysis. Section 5 discusses the results of the event study and regression analysis. Section 6 suggests theoretical and managerial implications. Finally, Section 7 discusses the study's limitations and concludes the article.

6.2 Conceptualisation

This section begins by defining the concept of social sustainability. Next, it explores how the social sustainability behaviour of firms is assessed. This leads into a discussion as to how this behaviour can be framed by three theories: signalling theory (Spence, 1974), the resource-based view (Barney, 1991), and resource dependence theory (Pfeffer & Salancik, 2003). Following that, the theories are used to develop three hypotheses. The section concludes by developing seven additional hypotheses that relate the social sustainability behaviour of firms to social and firm-level factors.

6.2.1 Social sustainability

Social sustainability refers to "a society that is just, equal, without social exclusion and with a decent quality of life, or livelihood, for all" (Koning, 2001, p. 9). Social sustainability "span[s] from labour conditions and wages through access to natural resource-based needs (e.g. food, water, house), to socioeconomic resources (health, informational/educational, financial etc."

(Waage et al., 2005, p. 1149). This is because social sustainability relates not only to what employees are paid but also to how product and production processes affect the parameters of their lives. McGhee and Grant (2016) argue that the objective of social sustainability is to achieve human flourishing or thriving. Human flourishing or thriving is defined as an organisational effort to help individuals achieve fulfilment by assuring all human rights to enable them to satisfy their needs and desires now and in the future, including a sense of uniqueness, dignity, freedom, happiness, and overall well-being within society (McGhee & Grant, 2016).

Organisations need to ensure that their employees, members of local communities, suppliers and customers are not subjected to conditions that systematically deteriorate the abilities and capabilities to satisfy their needs and desires. For example, firms that produced garments at the Rana Plaza in Dhaka, Bangladesh did not provide sufficient wages and basic facilities to their workers, which in turn influenced employee productivity and overall quality of life (The Guardian, 2013). Organisations may enhance working conditions and wages of employees, or provide assistance to communities after natural or man-made disasters and emergencies to ensure their long-term survival. Organisations need to look beyond their organisational boundaries, consider not only the employees but all of their stakeholders in society who can be affected by the organisations' business processes.

6.2.2 Reporting social activities

Social sustainability is a broad concept, and there are numerous dimensions to reflect firms' social behaviour. However, it is difficult to ascertain the impact of corporate social initiatives on society due to a lack of common metrics to measure them (Perrini & Tencati, 2006).

Currently, a variety of measures are used by firms to demonstrate the achievements of their social goals (Hutchins & Sutherland, 2008), including ratings by third-party agencies, such as KLD and DJSI. These agencies use voluntary disclosures of social initiatives by firms to assess the social performance of firms. However, such agencies also include firm environmental performance in their evaluation systems, making it difficult to find out the specific impact of firm social actions. For example, KLD, which rates the social actions of more than 650 companies in the United States (Kinder, Lydenberg, Domini Research & Analytics (KLD) Inc, 2006), categorises corporate social dimensions into six domains: 1) community support, 2) diversity, 3) employee support, 4) environment, 5) non-US operations and 6) product. Each domain is further divided into specific actions, such as concern for safety, job security, profit sharing, union relations and employee employment in the “employee support” domain. In addition to the mix of qualitative environmental and social actions ratings, the main concern with the third-party assessment systems is the aggregation of various activities into a single score. To improve their rating, firms may choose to better match their actions with the KLD ranking criteria. For example, they may decide to assign more importance to product/liability issues compared to community relations as the former criterion has a heavier weightage (20%) than the latter (10%) in the KLD evaluation system (Ruf, Muralidhar & Paul, 1998). Firms may also disclose information differently based on their preferences to improve their reputation and legitimacy (Conway, 2019). The lack of disclosure may be because firms may regard some social issues, such as labour rights, community support or employee support, as being outside their responsibilities and thus be unwilling to engage in them, especially if these actions are not required to be disclosed by law (McWilliams et al., 2006). Their lack of action in these domains may thus influence their overall rating. In comparison, actions focused on the domains of labour rights or human rights are often mentioned by firms

in their corporate social responsibility (CSR) reports because such activities enhance their social legitimacy (Mueckenberger & Jastram, 2010).

Another way to assess corporate social activity is to keep track of discrete press releases. Increased public awareness of a firm's social initiatives helps it demonstrate its concerns toward society, which impacts its reputation and legitimacy (Pérez et al., 2019). This effect can be seen in the change of a firm's market value. Wright et al. (1995), for example, reported that news of firms receiving awards for social actions programs was associated with a positive and significant change in market value, while announcements about firms found guilty of discriminatory practices was associated with a negative change in their market value. Other studies have analysed the impact of press releases on the market value of firms covering both positive and negative social activities (Pérez et al., 2019), and philanthropy (Patten, 2008). The impact of news about firm actions on firm market value indicates that such announcements are seen as signals by investors. The next section examines this in more detail.

6.2.3 Signalling theory and social sustainability initiatives

Signalling theory is based on the concept of reducing information asymmetry between two parties by "sending signals" (Spence, 2002). Generally, signalling theory is about one party looking for signals of observable actions by another party to extract unobservable or ambiguous attributes and their possible outcomes (Spence, 1974). In this way, the party that is interested in the actions of another party bridges the gap between the information that is available and the information that is required to assess the possible outcomes. For example, a firm, which has better information about its corporate social activities, sends signals in the form of press releases to influence the decision of stakeholders, such as investors. Such social initiative announcements by firms function as signals to investors about the type of activities

firms undertake to provide social benefits. According to signalling theory, investors will respond to such announcements by buying stocks if they expect such initiatives to improve a firm's reputation, which in turn motivates customers to use the firm's products or services, thus enhancing its future profitability. Past studies have argued that business activities directed towards social progress can improve an organisation's competitive advantage and long-term profitability (Matinheikki, Rajala, & Peltokorpi, 2017; Porter & Kramer, 2011). Therefore, it is hypothesised:

H1: Firms that initiate social activities will experience a positive stock market reaction.

6.2.4 Social initiatives and the use of resources

Drawing on signalling theory (Connelly et al., 2011), this study suggests that *announcements of social sustainability initiatives* serve as signals to investors and have an impact on firm financial performance, measured as the change in market value. The signals carry information, and their interpretation depends on the outlook of investors (Bergh et al., 2014; Connelly et al., 2011). One of the important considerations for investors interpreting such signals is whether the use of the resources mentioned in the announcement for social activities may have an impact on a firm's long-term survival, and/or whether the firm has the appropriate resources to carry out such social activities (Connelly et al., 2011). Firms improve their reputations when they carry out social activities, leading to higher customer loyalty (Kim, Ha, & Fong, 2014), which increases sales and profitability. Therefore, firms that announce they intend to carry out socially-responsible actions by themselves are indicating to investors that they are confident they possess the necessary resources and believe these actions will have a positive impact on their performance.

However, it is possible that a firm may not want to use its internal resources for socially responsible activities because of the uncertainty involved. Since "the payoff from socially

responsible programs is not guaranteed and may take time'' (Mohr & Webb, 2005, p. 122), managers are hesitant to invest in social initiatives that might lead to increased costs they may have to pass on to customers, affecting their competitive position. Additionally, firms often lack local knowledge, access to developing markets, and skills to engage effectively in social activities (Balaisyte et al., 2017).

In such situations, where there is little evidence of financial benefits and a lack of critical resources, a partnership approach appears to be a safer option for firms to achieve social goals. Resource dependence theory (RDT) explains how firms and their stakeholders form a network of interdependencies in the marketplace (Pfeffer & Salancik, 2003). Stakeholders, such as nonprofit agencies, governments, consumers, suppliers, and research organisations, possess unique resources, and firms form partnerships with them to acquire resources they lack or which are costly to develop internally. For example, businesses that partner with nonprofit agencies benefit from the latter's reputation, local knowledge, access to markets, and the knowledge and skills of managing different social issues (Balaisyte, Besiou, & Van Wassenhove, 2017). Nonprofits in turn benefit from a firm's resources, such as receiving donations, sponsorship, and cause-related marketing (Dong & Rim, 2019).

Dependence arising from resource scarcity enhances the capability and willingness of firms to meet their social objectives, increasing their legitimacy and reputation (Lefroy & Tsarenko, 2013). By relying on stakeholders through partnerships, firms signal to investors that they can meet their social objectives without committing too many resources, which could potentially jeopardize their operational activities. This leads to the following hypothesis:

H2: Firms that initiate social sustainability initiatives in partnership will experience a more positive stock market reaction than firms that initiate social sustainability initiatives without partnership.

6.2.5 Appropriateness of social sustainability activities

Besides the impact on resources, the credibility of the signals sent out by firms depends on whether the socially-responsible actions being carried out fit the firm's environment. For example, do the intended actions complement government efforts, are they closely-connected to local or national needs, or are they focused on high-priority areas. Actions that address high-priority issues may provide firms with greater financial benefits because associating with such prominent issues increases their visibility (Tyagi et al., 2013), reputation (Esen, 2013), and the legitimacy of their brand (Hur et al., 2014).

The UN Millennium Development Goals has reaffirmed that hunger prevention, education and health are global priorities (United Nations, 2019). By 2050, approximately 9 billion people will need to be adequately fed. Hunger and poverty are a widespread problem in developing as well as developed countries. In 2017, there were 39.7 million people in poverty in the USA (Fontenot et al., 2018). Education and skill acquisition are vital for improving social sustainability (Spangenberg et al., 2002), as are the health of individuals and communities (Mani et al., 2015b; Marshall et al., 2015). It is thus hypothesised that:

H3a: Firms that initiate hunger prevention activities will experience a more positive stock market reaction than firms that initiate other social activities.

H3b: Firms that initiate health improvement activities will experience a more positive stock market reaction than firms that initiate other social activities.

H3c: Firms that initiate education improvement activities will experience a more positive stock market reaction than firms that initiate other social activities.

6.2.6 Proactive and reactive social sustainability

Another indicator of the credibility of the signals sent out by firms is whether the socially-responsible actions being carried out have clearly foreseeable and unambiguous visibility impacts. For example, firms that initiate social activities in reaction to natural disasters, changes in laws, or pressures from non-government organisations (Becker-Olsen et al., 2006),

such as Canter Point Energy's donation \$1.25 million to post-Hurricane Harvey recovery and relief efforts, receive instant visibility, improving their reputation which may lead to better sales. Such actions, called "reactive initiatives", provide investors with an opportunity to evaluate a firm's intentions immediately and compensate it with a more positive opinion about their future, based on the match between the firm's actions and current expectations (Pyo, 1998; Zeithaml et al., 1993). In contrast, proactive initiatives are social activities that may produce benefits in the future (Becker-Olsen et al., 2006), such as HSBC's 'Women on the Rise in FinTech' initiative. The intentions behind proactive initiatives may be ambiguous as the actions do not provide any cues about the actualization of benefits in the long run. Thus, investors may not be confident whether a firm can justify the investment made in such endeavours. Therefore, it is hypothesised:

H4: Firms that initiate proactive social activities will experience a more negative stock market reaction than firms that initiate reactive social activities.

6.2.7 Growth opportunities

The credibility of the signals sent out by firms is also affected by the growth potential of a firm. Firms with greater growth opportunities might undertake socially-responsible actions to maintain their revenue levels, because such actions may complement other activities, such as advertising, that raise their public profile (Porter & Kramer, 2002). In contrast, firms with low growth opportunities which are seeking new ways to improve their sales may find it difficult to engage in socially-sustainable activities that have an ambiguous link to value creation in the short-term. Thus, investors may attach more importance to social activities of high growth firms (Cheng et al., 2014; Dhaliwal et al., 2011). Therefore, it is hypothesised:

H5: Firms that initiate social activities and have high growth opportunities will experience a more positive stock market reaction than firms that initiate social activities and have low growth opportunities.

6.2.8 Financial slack

The credibility of the signals sent out by a firm depends significantly on whether investors believe the firm possesses sufficient resources, especially financial assets, to carry out the activities it has announced. A firm's financial slack is represented by its reserves in the form of cash or other easily liquidated financial instruments (Greve, 2003). Financial slack would be inefficient if it was not strategically used to align a firm's resources and capabilities with the requirements of society. However, firms often lack the local knowledge, market access, and skills to carry out socially-responsible actions (Balaisyte et al., 2017). High financial slack enables firms to acquire these missing capabilities through partnership without affecting their existing business processes (Patzelt et al., 2008). Thus, firms with a high level of financial slack are more likely to initiate social activities than firms with low levels of financial slack (D. D. Lee et al., 2009). Therefore, it is hypothesised:

H6: Firms that initiate social activities and have high financial slack will experience a more positive stock market reaction than firms that initiate social activities and have low financial slack.

6.2.9 Visibility

One indicator of the credibility of a firm's intention to carry out socially-responsible activities is its reputation for doing so: if it is known widely for regularly engaging in such actions, investors will regard its announcements as having a higher chance of achieving its goals. Social visibility is the extent to which a firm is known to the public (Branco & Rodrigues, 2008; Reverte, 2009). Carroll and McCombs (2003) noted that news about firms' social activities influence people to form opinions on how these initiatives may influence society. The more a company's events are reported in the news, the more visible the firm would be and the better able to strengthen public opinion.

Firms increase their social visibility by engaging in socially responsible activities such as carrying out flood relief efforts, treating employees fairly, sponsoring events, donating funds, and providing training to veterans, women, etc. (Mahadeo et al., 2011). In addition to giving visibility, initiating social activities in partnership strengthens firms' commitment towards social improvement as both firms would be accountable to justify the objective of forming partnership (Lefroy & Tsarenko, 2013). Given that engaging in social activities is a potential source of legitimacy and reputation (Fombrun, 2005; Hsu, 2012; Zheng et al., 2015), and that legitimacy substantially enhances firm performance (Pfeffer & Salancik, 2003; Rao et al., 2008), higher visibility through initiating repeated social activities in partnership enhances legitimacy and reputation. The enhanced legitimacy and reputation influence customers' loyalty and word-of-mouth publicity may impact sales leading to improved financial performance. Therefore, it is hypothesized:

H7: Highly visible firms that initiate social activities will experience a more positive stock market reaction than less visible firms that initiate social activities.

6.3 Methodology

The hypotheses listed above will be tested using the event study methodology. This methodology will be used to compare the change in market value of the firms that announce that social activities. Event studies have been widely used in the management literature to study, for example, strategic alliances (Das et al., 1998), joint ventures (Merchant & Schendel, 2000), and acquisitions (Lee & Lim, 2006). The event study methodology is appropriate for this study because as it isolates the effect of other events from a short event window and provides an estimate of the financial impact of social initiatives.

According to the efficient market hypothesis, the stock market absorbs publicly available information rapidly and reflects it in the stock price, which either increases, decreases or does not change (Fama, 1970). Investors' responses to announcements when they first become

publicly available (i.e. observed normal returns) may differ from what would have happened in absence of such events (i.e., estimated normal returns) (Brown & Warner, 1985). An abnormal return is the difference between observed and expected normal returns, and provides an unbiased estimate of the effect of an event.

6.3.1 Sample

When firms initiate social activities, they announce such actions through press releases. This research followed several steps to create a sample of such announcements. First, the literature was searched to identify the keywords used to describe social sustainability activities (Table 22). These keywords were then categorised into four groups. Further keywords were added to the list after consulting with other researchers. The final search string and the search results are presented in Table 23. We searched for relevant announcements in Factiva in *{top sources (Dow Jones Newswires Or Press Release Wires Or Reuters Newswires Or The Wall Street Journal - All sources), in the USA, and in all industries between 01/01/2007 to 31/12/2018}*. Between 2007 and 2018, poverty in the US increased to 5.6%, compared to 4.2% between 2000-2018 (Kassa & Mokhiber, 2019). Median household income increased by 0.4% between 2007-2018 while it decreased by 0.3% between 2000-2018 (Kassa & Mokhiber, 2019). High incomes makes the economy stronger and stock markets more liquid (Beck & Demirguc-Kunt, 2009). Firms' social activities such as poverty reduction initiatives might influence investors to respond to those initiatives. The start and the end date for this study was chosen to capture and reflect this effect. The search resulted in over 199,000 announcements. The announcements were then read and scanned for their relevance to social sustainability and whether they were from listed firms. This resulted in a sample of 1,674 announcements of listed firms, including multiple announcements from the same firm in a given year.

Table 22: Dimensions of social sustainability

Keywords used to describe socially-responsible actions	Authors
Employment benefits and relations	Popovic et al. (2018)
Health and safety practices and incidents	Govindan, Khodaverdi and Jafarian (2013); Huq, Chowdhury, & Klassen (2016); Mani, Agrawal, & Sharma (2015); Yusuf et al. (2013); Popovic et al. (2018)
Training, education, and personal skills	Popovic et al. (2018); Huq et al. (2016); Mani et al. (2015)
Diversity and equal opportunities	Popovic et al. (2018); Haar and Copeland (2010); Staniškienė and Stankevičiūtė (2018)
Employment practices	Popovic et al. (2018); Van Buren and Greenwood (2013)
Human rights (Employment of sweatshop labour, forced labour and child labour)	Popovic et al. (2018); Leire and Mont (2010); Pagell and Wu (2009); Mani et al. (2016)
Poverty	Ajmal, Khan, Hussain, & Helo (2018); Rodríguez, Thomsen, Arenas, & Pagell (2016)
People skills and abilities	Sarkis et al. (2010); Pullman et al. (2009)
Wages	Leire and Mont (2010); Hutchins and Sutherland (2008); Mani et al. (2016)
Job creation	Slaper and Hall (2010); Ma and Okudan Kremer (2015); Osti (2012)
Working conditions	Pagell and Wu (2009); Large, Kramer, & Hartmann (2013); Pashaei Kamali, Borges, Osseweijer, & Posada (2018)
Human welfare, community development	Klassen and Vereecke (2012); Sarkis et al. (2010)
Quality of life	Pullman et al. (2009)
Philanthropy and charity	Hutchins and Sutherland (2008)
Social equity	Krause et al. (2009); Bansal et al. (2005)
Disaster relief	Piecyk and Björklund (2015); Johnson et al. (2011); Kovens and Spens (2007); Kunz and Gold (2017)
Humanitarian	Kunz and Gold (2017)
Emergency	Piecyk & Björklund (2015)
Employee injuries	Neuman et al. (2018)
Ethics	Gopalakrishnan et al. (2012); Mani et al. (2014); Mani et al. (2015b)

Table 23: Keywords and search results

Keywords	Search results from 2007 to 2018	Keywords	Search results from 2007 to 2018
Without partnership		With partnership	
("job creation" OR "wages" OR "health & Safety" OR "working condition*")	19210	("job creation" OR "wages" OR "health & Safety" OR "working condition*") near15 ("collabor*" OR "coordinat*" OR "cooperat*" OR "partner*" OR "ally" OR "alliance*" OR "work* together" OR "together" OR "joint*" OR "joint venture" OR "participat*" OR "coalition" OR "interrelation*" OR "tie in" OR "tie-up" OR "mutual*" OR "associat*" OR "cocreat*" OR "combin*" OR "interact*" OR "agreement" OR "integrat*" OR "relation*" OR "shared process*")	857
("human rights" OR "diversity" OR "social equity" OR "fairness" OR "training" OR "skill* development" OR "educat*" OR "ethic*")	114129	("human rights" OR "diversity" OR "social equity" OR "fairness" OR "training" OR "skill* development" OR "educat*" OR "ethic*") near15 ("collabor*" OR "coordinat*" OR "cooperat*" OR "partner*" OR "ally" OR "alliance*" OR "work* together" OR "together" OR "joint*" OR "joint venture" OR "participat*" OR "coalition" OR "interrelation*" OR "tie in" OR "tie-up" OR "mutual*" OR "associat*" OR "cocreat*" OR "combin*" OR "interact*" OR "agreement" OR "integrat*" OR "relation*" OR "shared process*")	6192

("donation" OR "charity" OR "philanthropy" OR "disaster relief" OR "disaster recovery" OR "humanitarian aid" OR "humanitarian" OR "NGO*" OR "non-governmental organi*" OR "relief operation*" OR "disaster management" OR "emergency management")	57016	("donation" OR "charity" OR "philanthropy" OR "disaster relief" OR "disaster recovery" OR "humanitarian aid" OR "humanitarian" OR "NGO*" OR "non-governmental organi*" OR "relief operation*" OR "disaster management" OR "emergency management") near15 ("collabor*" OR "coordinat*" OR "cooperat*" OR "partner*" OR "ally" or "alliance*" OR "work* together" OR "together" OR "joint*" OR "joint venture" OR "participat*" OR "coalition" OR "interrelation*" OR "tie in" OR "tie-up" OR "mutual*" OR "associat*" OR "cocreat*" OR "combin*" OR "interact*" OR "agreement" OR "integrat*" OR "relation*" OR "shared process*")	2347
Total announcements	199751		

Second, we followed the two-step process to confirm the earliest announcement date, known as the “event date”, of each announcement (Park, Park, & Zhang, 2003). First, we used Factiva to search the top sources with the firm’s name as it appeared in each announcement and sorted the search results by ‘oldest first’. Next, we cross-checked the date of announcements from firms’ websites. If discrepancies in the dates were found, the date mentioned on the firms’ websites is used in the analysis. For non-listed subsidiaries, the event date is the earliest trading day of their parent organisations. Next, we collected the firm identifiers to collect stock price and stock index data. We also confirmed whether firms are active by looking at changes in their trading volumes during the event window after checking for confounding events.

Third, we searched for confounding events for each announcement identified in the previous process. Confounding events are financially relevant events, such as declarations of earnings and dividends, equity offerings, quarterly and annual results, awards, collaboration and partnership announcements, and changes in the roles of key executives (McWilliams & Siegel, 1997), that occur at the same time as the event being studied, and make it difficult to distinguish the effect of the focal event. A three-day window (-1, 0, +1) is used to identify confounding events (Brown & Warner, 1985), where day 0 is the event day. For non-listed subsidiaries with listed parent organisations, a confounding events check is performed for both subsidiaries and their parent organisations in a three-day event window. Lastly, we identified whether the announcements were with or without partnership. We individually checked each announcement for keywords such as “partnership”, “partners”, “strategic partnership”, “strategic alliance”, “acquired” or “merged”.

We removed 873 announcements that coincided with confounding events. 35 announcements were removed due to unavailability of stock prices, leaving 765

announcements in the sample for event study analysis (Table 24). There were 705 partnership announcements (e.g. Figure 11) and 60 without partnership (e.g. Figure 12) announcements in the sample.

Table 24: Number of announcements

		Number of announcements
1	Search announcements of listed US firms between 2007 to 2018 for keywords	1674
2	Confounding events removed	873
3	Events left	800
4	Events removed due to unavailability of data	35
5	Final sample	765
6	With/without partnership	705/60

BJ's Wholesale Club Announces \$100,000 Grant to the Lowcountry Food Bank

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Grant will help secure, store and distribute fresh, healthy food to people facing hunger

CHARLESTON, S.C., Aug. 14, 2017 /PRNewswire/ -- BJ's Wholesale Club today announced a \$100,000 donation from the BJ's Charitable Foundation to the Lowcountry Food Bank, a Feeding America(R) member food bank. The donation will help the Lowcountry Food Bank secure, store and distribute fresh, healthy food for the 10 coastal counties of South Carolina.

The Lowcountry Food Bank is one of nine Feeding America member food banks to benefit from BJ's Charitable Foundation's \$1 million donation to Feeding America, the nation's largest domestic hunger-relief organization. BJ's \$1 million donation to Feeding America is the foundation's largest single donation to any organization to date.

"BJ's is bringing a fresh approach to nourishing communities and helping families thrive, and we're proud to support the Lowcountry Food Bank," said Kirk Saville, executive director of the BJ's Charitable Foundation. "No one should have to worry about where to get their next meal, and we know that food banks face challenges in storing and distributing perishable foods. Our strategic partnership with Feeding America is focused on building capacity for fresh food at local food banks so we can work together to put an end to hunger in our communities."

BJ's \$100,000 grant will support the Lowcountry Food Bank's purchase of a 24-foot insulated, refrigerated truck to expand its new Fresh Xpress program and increase its distribution capacity for bulk quantities of fresh, nutritious produce. The Fresh Xpress program assists local agencies in distributing produce utilizing a farmer's market-style distribution model, empowering families with the opportunity to choose the types of produce and quantity that meets their needs, instead of receiving a pre-packaged box.

"At the Lowcountry Food Bank, we strive to create a more food secure future for our neighbors in need, and we're grateful to have BJ's support in leading the fight against hunger in our community," said Pat Walker, President and CEO of the Lowcountry Food Bank. "Each year, we distribute more than six million pounds of fresh produce to families, children and seniors in the Lowcountry. With BJ's generous donation, we will be able to increase that number to distribute fresh, nutritious and healthy food to a wider and more diverse audience."

Since 2009, BJ's has provided ongoing support to Feeding America through the BJ's Charitable Foundation and BJ's Feeding Communities(R) program, helping local food banks successfully expand their programs to reach wider and more diverse audiences.

In addition to capacity building grants from the BJ's Charitable Foundation, BJ's has secured over 50 million pounds of donated food, including fresh produce, frozen meats and fish, baked goods and dairy items through the BJ's Feeding Communities(R) program.

To learn more about the BJ's Charitable Foundation and its Feeding Communities Program, visit bjs.com/charity.

To learn more about the Lowcountry Food Bank, visit lowcountryfoodbank.org.

About BJ's Wholesale Club, Inc.

Headquartered in Westborough, Massachusetts, BJ's is the leading operator of membership warehouse clubs in the Eastern United States. The company currently operates 215 clubs and 132 BJ's Gas(R) locations in 16 states.

BJ's provides a one-stop shopping destination filled with top-quality, leading brands, including its exclusive Wellsley Farms(R) and Berkley Jensen(R) brands, along with USDA Choice meats, premium produce and

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Figure 11: Partnership based social initiative

RTTN
Microsoft To Require Suppliers, Partners To Offer Employees Paid Parental Leave

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Microsoft Corp. (MSFT) has announce that it will ask its partners and suppliers to offer paid parental leave. The company's US suppliers will be required to offer their employees a minimum of 12 weeks paid parental leave, up to \$1,000 per week. This change applies to all parents employed by Microsoft's suppliers who take time off for the birth or adoption of a child. The new policy applies to suppliers with more than 50 employees and covers supplier employees who perform substantial work for Microsoft. "We have long recognized that the health, well-being and **diversity** of our employees helps Microsoft succeed. That's why we provide industry-leading benefits for our employees, including comprehensive health and wellness programs for families, paid vacation, paid sick leave and paid time off for new parents," the company said in a statement. Microsoft said it will work with its suppliers to understand the impacts of the change and will assist them.

The company said it will "ultimately result in increased costs for Microsoft." "We also know that we rely on a wide array of other companies to supply us with goods and services that reflect their core competencies, and that the people who work for our suppliers also are critical to our success. That is why we took the step three years ago to require our U.S. suppliers doing substantial business with Microsoft to provide paid time off for their employees."

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Figure 12: A social initiative without partnership

6.3.2 Estimation window

The abnormal return is calculated over a short event window as this maximises the ability to connect the event to the change in market value (McWilliams & Siegel, 1997). The study used an estimation period of 250 trading days (-261 to -11), with a ten-day isolation period, as has been used in similar multi-country event-studies (Park, 2004; Wassmer & Dussauge, 2012). The ten-day interval shields the expected returns from the effects of the announcement and takes into account the non-stationarity of the estimates (Jacobs et al., 2010).

6.3.3 Computation of cumulative average abnormal returns

The measure of abnormal returns (ARs) is based on the market model residual. The market model residual was calculated as the difference between the actual stock returns and expected stock returns on day t .

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

where R_{it} is the expected return of stock i on day t , R_{mt} is the stock market m return on the day t , α_i is the intercept of the relationship for stock i , and β_i is the slope of the relationship for a stock i with respect to the market return. The term $\beta_i R_{mt}$ is the portion of the rate of return on a market portfolio to stock. The error term ε_{it} for stock i on day t is the portion of the return that cannot be explained by market movements and therefore captures the change in market value related to the event. α_i and β_i was estimated using Ordinary Least Squares (OLS) regression over the 250-days estimation period from $t = -261$ to -11 days to calculate the expected stock returns (Jacobs, Singhal, & Subramanian, 2010; Park, 2004).

The abnormal returns (ARs) for the day t is defined as:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \quad (2)$$

Abnormal returns were aggregated across firms to calculate average abnormal returns (AARs). The AARs for all firms at day t was calculated as follows:

$$\overline{AR}_t = \frac{1}{N} \sum_{i=1}^N AR_{it} \quad (3)$$

Where N is the number of firms in the sample.

The cumulative abnormal returns (CARs) for this study are calculated using S&P 500 as market index and summing up the AARs in the three-days event window $(-1, 1)$ as follows:

$$CAR(-1, 1) = \sum_{i=-1}^1 \overline{AR}_t \quad (4)$$

The computation of CAARs in the event window $(-1, 1)$ tests H1. A subsample analysis is carried out to test H2 and H3. In this analysis, the CARs were computed and compared against two subsamples; one sample consists of initiatives for social activities without partnership and another sample with partnership. The CARs of partnership subsample were used as a

dependent variable in the hierarchical regression model to test H4a, H4b, H4c, H5, H6, H7 and H8.

6.3.4 Dependent variable

Cumulative abnormal returns (CARs) resulting from the sub-sample analysis of only partnership events were used as the dependent variable. Sub-sample analyses were performed to compare the extent of benefits to firms of using partnerships for initiating social activities with those that have not use partnership. Second, if using partnership is beneficial, then what firm-level factors may impact abnormal returns in partnership. Using a dummy variable in a complete sample of regression analysis can only demonstrate whether using partnership influence CARs. However, it will not show the impact of firm-level factors on abnormal returns that result from initiating social activities in partnership. The objective of this research was to estimate the impact of using partnership on CARs and what firm-level factors increase/decrease CARs if a firm decides to enter into partnership for initiating social activities.

6.3.5 Independent variables

Five independent variables were used in the hierarchical regression model to test Hypotheses 4 to 8. The measures of hunger prevention, health, education, proactive, growth opportunities, financial slack, and visibility were constructed as follows:

Hunger Prevention (Hung_Prev) was a dummy variable. Hung_Prev is coded 1 if the firm addressed hunger prevention, 0 otherwise. A positive coefficient is predicted.

Health (Health) was a dummy variable. Health is coded 1 if the firm addressed health issues, 0 otherwise. A positive coefficient is predicted.

Education (Education) was a dummy variable. Education is coded 1 if the firm addressed social issues related to education, 0 otherwise. A positive coefficient is predicted.

Proactive (Proactive) was a dummy variable. Proactive is coded as 1 if such initiatives were announced, 0 otherwise. A positive coefficient is predicted.

Growth opportunities (Gr_Opp) was measured using the ratio of book value to market value (Fama & French, 1992). The market value is the stock price multiplied by the number of outstanding shares as reported ten days prior to the announcement date; the book value is the asset value obtained for the fiscal year (t-1) prior to the announcement date (Hendricks & Singhal, 2003). DataStream is used for data collection. A negative coefficient is predicted for Gr_Opp.

Financial Slack (Fin_Slack) was measured as current ratio, using the ratio of current asset to current liability (Shen & Chang, 2009). All values were obtained for the fiscal year (t-1) prior to the announcement date. The data is collected from DataStream. A positive coefficient is predicted.

Visibility (Visibility) was measured by counting the total number of announcements of a firm between 2007 and 2018, prior to the event date, including the announcements excluded during confounding events check, following Fang and Peress (2009) and Reverte (2009). A positive coefficient is predicted.

6.3.6 Control variables

This study controls four variables, expected to influence the financial performance of the firms that initiate social activities in partnership. Several data sources were used to collect data: websites and the annual reports for firm age, DataStream for firm size, and SIC codes for Industry affiliation.

The first control variable is Industry affiliation (Ind_Affl). Mature industries whose members are known to actively initiate social activities because their production processes affect employees and communities directly (Kiessling et al., 2016). These firms demonstrate

social concerns by initiating social activities to improve their reputation and legitimacy (Kiessling et al., 2016). This study categorises industries into manufacturing and service industries. The manufacturing industries are agriculture (SIC 01xx), mining (SIC 13xx), construction (SIC 15xx, and manufacturing (SIC 20xx – 38xx). These industries are mature and known for their social activities. If the firm making the announcement belongs to any of those industries, a dummy variable was coded as 1, and 0 otherwise.

The second control variable is firm age (Firm_Age), measured as the difference of time from the date of announcement and the firm's founding date (Kalaiganam et al., 2007). Brammer and Millington (2005) have found that social initiatives influence reputation and public visibility. Firm age is an important determinant of visibility and reputation (Lin et al., 2015), so it was controlled to account for the difference in the visibility and reputation of old and new firms.

The third control variable is firm size (Firm_Size) as previous event studies reported that financial performance is affected by firm size (Kim, Wagner, & Colicchia, 2019; Jeong, Jeong, Lee, & Bae, 2018). With more societal visibility and huge financial slack, larger firms are more likely to initiate social activities (Bowen, 2002; Kiessling et al., 2016). Firm size was assessed by the total revenue of the firm as reported in the fiscal year (t-1) prior to the announcement date (Shankar, 1999). This measure is natural log-transformed to normalise it (Dekimpe et al., 1997).

6.3.7 Descriptive statistics of the variables

Table 26 presents descriptive statistics of the independent and control variables used in the regression. An overall sample consisted of 705 announcements of social initiatives in partnership. 578 out of 705 announcements of social initiatives in partnership were used in the regression analysis. 127 announcements of banking firms were removed from the sample

because banking firms do not report current ratio, a variable used to measure financial slack. This sample consisted of a range of firm sizes measured as annual revenue. The minimum and maximum revenues were 14.50 and 485651.00 million US\$ respectively. The natural log-transformed values of firm size were used in the regression analysis. The median book-to-market ratio was 0.384, and the minimum value was 0.003. The minimum and maximum value of the financial slack was 0.30 and 14.13 respectively. The average age of the firms was 65.67 years. The youngest firm was 1 year old, and the oldest firm was 210 years old. The sample showed a range of social initiatives: 68 observations addressed hunger prevention, 53 observations addressed health, 143 observations addressed educational issues, and 318 observations addressed other social issues, including 179 disaster relief initiatives (Table 25). 401 observations focused on proactive social issues, and 215 observations were from goods-producing firms. Table 27 presents the Pearson correlation table for the variables used in the sectional regression model.

Table 25: Grouping of announcements

Social initiatives	Number of announcements	Other social initiatives	Number of announcements
Hunger prevention	68	Re-localise mfg. to help a local community	1
Health	54	Collect and donate unused damaged Products	1
Education	143	Moral support for soldiers' families	18
		Lower energy costs	7
		Disaster relief work	179
		Donate clothes, toys, backpack, toilet paper, or shoes	17
		Wages, jobs and diversity	30
		Domestic violence, family, and children	12
		Animal and wildlife rescue	6
		Preserving historical artifact, repairing infrastructure, affordable housing, and rebuilding	17
		Donation for water crisis and biological diversity	6
		Donation to arrange transport and logistics	4
		Involve the community in promotion or charity	9
		Improve safety at the workplace	1
		Encourage ethical sourcing	1
		Donation to improve packaging	1
		Donation to deter human trafficking	1
		Help people with disability	1
		Donate refrigerator	1
		Motivate young people to deter war in Sudan	1

6.3.8 Hierarchical regression model

The following regression model tests the effect of independent variables identified in Section 6.4.4 on the CARs when firms announced social sustainability initiatives in partnership:

$$\begin{aligned}
CAAR_{i(d1,d2)} = & \beta_0 + \beta_1 Good_Prod_{Ind} + \beta_2 Firm\ Age & (5) \\
& + \beta_3 \ln(Firm_Size) + \beta_4 Hung\ Prev + \beta_5 Health \\
& + \beta_6 Education + \beta_7 Proactive + \beta_8 Gr_Opp + \beta_9 Fin_Slack \\
& + \beta_9 Fin_Slack + \varepsilon_i
\end{aligned}$$

A hierarchical regression was conducted with three models. The first model used the control variables. The second model contained both the control variables as well as the independent variables, but without including visibility. The third model contained all the independent and control variables to test the hypotheses.

Table 26: Descriptive statistics of independent variables

	Number	Mean	Median	S.D.	Minimum	Maximum
Annual revenue (US\$ millions)		32844.180	10371.390	66652.820	14.502	485651.000
Book-to-market ratio		0.462	0.384	0.470	0.003	9.090
Current ratio		1.739	1.470	1.284	0.300	14.130
Firm age (Years)		65.670	56.000	43.337	1.000	210.000
Number of goods-producing firms (Mining, manufacturing, construction, and agriculture)	214.000	0.370	0.000	0.483	0.000	1.000
Number of announcements prior to event date		3.228	2.000	3.716	1.000	21.000
Number of announcements addressing hunger prevention	68.000	0.117	0.000	0.322	0.000	1.000
Number of announcements addressing health issues	54.000	0.093	0.000	0.291	0.000	1.000
Number of announcements addressing issues related to education	143.000	0.247	0.000	0.432	0.000	1.000
Number of proactive announcements	401.000	0.307	0.000	0.461	0.000	1.000

Table 27: Correlations between independent and dependent variables used in the regression

	1	2	3	4	5	6	7	8	9	10	11
	CAR	Goods-Producing firms	Firm_age	Firm_size	Visibility	Hunger_prevention	Health	Education	Proactive	Growth_Pot	Financial_Slack
1	1										
2	0.032	1									
3	-0.015	0.275***	1								
4	0.003	-0.039	0.279***	1							
5	-0.049	-0.093**	0.116***	0.276***	1						
6	0.040	0.121***	0.132***	-0.013	0.109***	1					
7	-0.001	-0.073*	-0.053	-0.074*	-0.058	-0.117***	1				
8	-0.078	-0.024	-0.003	-0.071*	-0.263***	-0.209***	-0.184***	1			
9	-0.050	0.014	0.000	-0.061	0.200***	-0.231***	-0.188***	-0.364***	1		
10	-0.030	0.029	-0.142***	-0.178***	-0.054	0.058	0.092**	0.004	0.052	1	
11	0.032	0.206***	-0.182***	-0.347***	-0.094**	-0.076*	-0.001	-0.048	-0.016	0.181***	1
Mean	0.042	0.370	65.670	16.031	3.228	0.117	0.094	0.247	0.692	0.462	1.739
S.D.	2.568	0.483	43.338	1.797	3.716	0.322	0.291	0.432	0.462	0.470	1.284

Significance levels (one-tailed tests): * 10% level, **5% level, *** 1% level

6.4 Results

Table 28 demonstrates the results of the full sample event study analysed using the multi-country and Fama-French market model for the announcements of firms that have initiated social activities in the three-day (-1, +1) event window. The results show a positive, but a very small change in the market value of firms. The mean CAARs was 0.03%, insignificant for all parametric as well as non-parametric test statistics. The result was consistent with the Fama-French 3-factor model (Table 28). The CAARs was 0.004%, insignificant for all parametric as well as non-parametric test statistics.

Table 30 shows the results of a subsample event study analysed using the multi-country and Fama-French market model for the announcements of firms that have initiated social activities without partnership in the three-day (-1, +1) event window. The results show a negative, but a very small change in the market value of firms. The mean CAARs was -0.08%, insignificant for all parametric as well as non-parametric test statistics. The result was consistent with the Fama-French 3-factor model (Table 30). The CAARs was -0.004%, insignificant for all parametric as well as non-parametric test statistics.

Table 32 presents the results of a subsample event study analysed using the multi-country and Fama-French market model for the announcements of firms that have initiated social activities with partnership in the three-day (-1, +1) event window. The results show a positive, but a very small change in the market value of firms. The mean CAARs was 0.03%, insignificant for all parametric as well as non-parametric test statistics. The result was consistent with the Fama-French 3-factor model (Table 32). The CAARs was 0.004%, insignificant for all parametric as well as non-parametric test statistics. An independent sample t-test confirms an insignificant difference in the CAARs for partnership ($M = 0.03\%$, $SD = 0.026$) and no-

partnership for social initiatives ($M = -0.08\%$, $SD = 0.031$) conditions; $t(66.06) = 0.274$ $p = 0.785$
(one-tailed test).

Table 28: Event study results using market model and 3-factor market model for the full sample

Model	n	Mean CAR	% positive	Cross-sectional t	Patell Z	Wilcoxon Rank	Corrado rank	Sign test
Market model	765	0.020%	48.93%	0.2656	0.1093	-4018.5000	-0.1790	-0.2060
3-factor model	705	-0.080%	48.09%	0.8524	-0.1516	-2961.1666	-0.2283	-0.6157

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level

Table 29: Event study results using market model for the full sample

Period	n	Mean CAR	Median	% Positive	t-test Cross-sectional	Patell Z	Wilcoxon Rank Test	Corrado Rank	Sign test
-3	765	-0.02%	-0.03%	48.75%	-0.3178	-0.2895	-3302.5000	-0.3452	-0.1337
-2	765	-0.11%	0.00%	46.79%	-1.2574	-1.8894	-11510.5000*	-1.8561*	-1.2183
-1	765	-0.06%	-0.05%	50.06%	-0.6053	0.5397	1791.5000	0.5631	0.5892
0	765	-0.06%	0.00%	48.10%	-0.5019	-0.1881	-2343.5000	-0.3772	-0.4953
1	765	-0.08%	0.00%	48.62%	-0.6396	-0.1622	-4018.5000	-0.1671	-0.2060
2	765	0.02%	0.00%	49.94%	0.1202	0.6349	3633.5000	0.4548	0.5169
3	765	-0.06%	-0.05%	46.92%	-0.3799	-1.2149	-12638.5**	-1.6268*	-1.1460
(0, +1)	765	-0.01%	-0.04%	48.10%	-0.2234	-0.2477	-4018.5000	-0.3452	-0.2060
(-1, 0)	765	0.04%	0.08%	49.04%	0.5880	0.2486	-2343.5000	-0.5426	-0.4953
(-1, +1)	765	0.02%	0.04%	48.93%	0.2656	-0.1093	-4018.5000	-0.1790	-0.2060

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level

Table 30: Event study results using market model and 3-factor market model for subsample (Without partnership)

Model	n	Mean CAR	% positive	Cross-sectional t	Patell Z	Wilcoxon Rank	Corrado rank	Sign test
Market model	60	0.08%	51.66%	0.1968	-0.1445	67.0000	0.4577	0.4134
3-factor model	60	-0.28%	49.44%	-0.7371	-0.3209	-5.3333	-0.2001	0.2239

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level

Table 31: Event study results using market model for subsample (Without partnership)

Period	n	Mean CAR	Median	% Positive	t-test Cross-sectional	Patell Z	Wilcoxon Test	Corrado Rank	Sign test
-3	60	-0.06%	0.00%	50.00%	-0.2919	0.5107	-2.0000	0.2935	0.1550
-2	60	-0.13%	-0.16%	45.00%	-0.7981	-0.9632	-100.0000	-0.7347	-0.6201
-1	60	-0.09%	0.03%	50.00%	-0.4658	-0.387	-49.0000	0.1124	0.1550
0	60	0.10%	0.07%	53.33%	0.4343	0.6412	106.0000	1.0282	0.6718
1	60	-0.09%	0.08%	51.66%	-0.2380	-0.5045	67.0000	0.4587	0.4134
2	60	0.05%	0.04%	50.00%	0.2033	-0.7752	-26.0000	0.0527	0.155
3	60	0.04%	0.01%	38.33%	-1.9339*	-1.3244*	-241.0000*	-1.4694*	-1.6537
(0, +1)	60	0.01%	0.20%	48.30%	0.0335	0.0966	87.0000	0.4009	0.4134
(-1, 0)	60	0.00%	0.08%	51.66%	0.0317	0.1791	106.0000	0.9698	0.6718
(-1, +1)	60	-0.08%	0.16%	51.66%	0.1968	-0.1445	67.0000	0.4577	0.4134

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level

Table 32: Event study results using market model and 3-factor market model for subsample (With partnership)

Model	n	Mean CAR	% positive	Cross-sectional t	Patell Z	Wilcoxon Rank	Corrado rank	Sign test
Market model	705	0.03%	48.36%	0.3507	0.1560	-4744.5000	-0.3105	-0.3353
3-factor model	705	0.00%	47.03%	0.0455	-0.0644	-5631.5000	-0.5101	-1.0135

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level

Table 33: Event study results using market model for subsample (With partnership)

Period	n	Mean CAR	Median	% Positive	t-test Cross-sectional	Patell Z	Wilcoxon Rank	Corrado Rank	Sign test
-3	705	0.00%	0.03%	48.65%	-0.2508	-0.4506	-2898.5000	-0.4394	-0.1846
-2	705	0.00%	0.09%	46.95%	-1.2999	-1.6872	-9488.5000*	-1.7360*	-1.0889
-1	705	0.00%	0.00%	50.07%	0.9076	0.6751	2129.5000	0.5566	0.5689
0	705	0.00%	-0.05%	47.66%	-0.0559	-0.3830	-3441.5000	-0.6718	-0.7121
1	705	0.00%	-0.05%	48.37%	-0.2845	-0.0217	-4744.5000	-0.2985	-0.3353
2	705	0.00%	0.00%	49.93%	1.4268	0.8875	3576.5000	0.4599	0.4935
3	705	0.00%	0.05%	47.66%	-0.7263	-0.8792	-8867.5000	-1.2980*	-0.7121
(0, +1)	705	-0.02%	-0.06%	48.36%	0.2565	0.2862	-4744.5000	-0.4654	-0.3353
(-1, 0)	705	0.05%	0.08%	47.65%	0.6002	0.2065	-3441.5000	-0.8207	-0.7121
(-1, +1)	705	0.03%	0.01%	48.36%	0.3507	0.1560	-4744.5000	-0.3105	-0.3353

Significance levels (two-tailed tests): * 10% level, **5% level, *** 1% level

6.4.1 Regression results

Table 34 presents the result of hierarchical regression analysis using CAARs as the dependent variable. Model 3 allowed us to test the hypotheses and evaluate the relationship between independent variables and the CAARs; partnership for addressing hunger prevention shows slight support for H4a. The regression result for the growth opportunities shows support for H5, suggesting high growth firms that initiated social activities in partnership experienced a positive change in the market value. Contrary to the hypothesis, there is negative evidence of support for H7, suggesting high levels of visibility is associated with the less positive change in the market value of the firms. There is no evidence of support for H4b, H4c, and H6 that hypothesised a positive change in the market value of the firms that addressed health and education issues and have high financial slack. The signs of the coefficients of health and education resulted in the opposite and insignificant. Finally, the coefficient of financial slack resulted as predicted but insignificant.

Table 34. Results of cross-sectional regression analysis (n= 578) The dependent variable is the CARs over three days (-1, +1), calculated using the market model.

Independent Variables		Model 1		Model 2		Model 3		VIF
		Coefficient	Robust Std. Error	Coefficient	Robust Std. Error	Coefficient	Robust Std. Error	Model 3
Intercept		-0.2371	0.9643	-0.7780	1.0817	-0.8695	1.0817	
Goods_Prod_Ind	Control	0.0688	0.6957	-0.01198	0.2024	-0.0417	0.2026	1.2074
Firm_Age	Control	0.0002	0.0022	0.0007	0.0023	0.0011	0.0023	1.2542
Firm_Size	Control	0.0115	0.0592	0.0318	0.0617	0.0463	0.0616	1.3211
Hung_Pre	H3a			0.3180	0.28542	0.3553*	0.2821	1.3511
Health	H3b			-0.0165	0.3096	-0.0568	0.3124	1.2419
Education	H3c			-0.1650	0.2440	-0.2345	0.2538	1.5296
Proactive	H4			-0.0228	0.2307	-0.0592	0.2317	1.5047
Gr_Pot	H5			0.3170**	0.1469	0.3233**	0.1456	1.0701
Fin_Slack	H6			0.036	0.0651	0.0556	0.0647	1.2634
Visibility	H7					-0.0365*	0.0261	1.2097
F		0.3151		0.6991		0.9623		
Significance		0.8145		0.7100		0.4754		
Observed R ²		0.0004		0.0117		0.0156		
Adj R ²		-0.0035		-0.0047		-0.0017		

Significance levels (one-tailed tests): * 10% level, **5% level, *** 1% level.

Negative Adj. R² signifies a bad data fit

6.4.2 Model diagnostics

The regression results show that the F statistic is insignificant, and the R-squared value in Model 3 is very low (1.5%). The observed statistical power of this regression model is 62%, which is less than the required level (80%) suggested by Cohen (2003). The variance inflation factor (VIF) for all variables in Model 3 is less than 5.0, indicating that multicollinearity is not a concern (Cohen, Cohen, West, & Aiken, 2003). The studentised Breusch-Pagan test (Breusch & Pagan, 1979) reveals the presence of heteroscedasticity (BP = 43.454, df = 10, p-value = 0.000). An analysis of hat-values determines the presence of influential observations (Fox & Weisberg, 2018). However, all values are less than 0.5. We decided to include these observations in the dataset as removing them from the regression will result in reduced sample size and may induce additional bias in the estimation. Following Fox and Weisberg

(2018), we conducted robust regression analysis as this ensures the reliability of estimation coefficients and robust standard errors (Wright & London, 2009).

6.5 Discussion

Using signalling theory and resource dependence theory as theoretical lenses, the present study analysed how corporate social initiatives affected firm financial performance, measured as the change in market value. The analysis was based on an overall sample of 765 announcements, comprising 60 announcements without partnership and 705 announcements with partnership, reported during 2007 to 2018. The average financial performance, measured as the change in the market value of firms (0.02%), was unaffected by initiating social activities. The results did not change for the firms that initiated social activities without (-0.08%) as well as with partnership (0.03%) except the direction of the change in the market value. The market value of the firms that initiated social activities without partnership was negative compared to the market value of the firms that initiated social activities with partnership, but without a significant difference between them. The results of the short-term event study are neutral and fail to report any significant increase or decrease in the financial performance of firms.

Comparing with prior studies, the results are similar to those of Jacobs et al. (2010), Cheung (2011), Bird et al. (2012), and Schröder (2007). Such studies examined how inclusion into sustainability indexes, getting environmental awards, and environmental protection resulted in no change in the market value of firms. A close examination of the previous studies highlights two important observations. First, the studies did not report savings or impact on sales or revenue. Second, the studies focused on the impact on firm market value of business activities that affect human lives indirectly. For example,

improving human health through reduced emissions is an indirect effect because firms enhance business processes to reduce the environmental impact that affects human health. This study extends the analysis to the social context where firms directly affect human lives by their activities, such as job creation or providing training to their employees. Although the context of the present and the previous studies are different, the effect of the social activities on financial performance, measured as the change in the market value, produces similar results. The interesting findings of this study are the firms' market value remained unaffected when they initiated social activities with or without partnership. One of the interpretations being that the resource investment, whether developed internally or shared with the stakeholders, does not seem to have a positive impact on the revenue generation or profitability. Initiating social activities in partnership is distinguishable as it demonstrates contributions of non-overlapping resources including knowledge, skills, capabilities, and management practices, and a fit between culture and social goals of partners (Austin & Seitanidi, 2012; Kale & Singh, 2009). However, the analysis shows that investors were indifferent whether firms initiated social activities with or without partnership. Future studies may investigate what resources matter for sustainability in the social context or firms should address social issues solely for altruistic reasons (Lantos, 2001).

The poor fit of the regression model means that the results obtained from the regression analysis may not be reliable. The statistical power analysis suggests the sample size needs to be increased to 900. Adding more variables to the model may improve the model fit. Future studies can add more variables and collect a larger sample to verify the results of this study. Alternatively, the method can be used to validate the findings of this study. Theoretically,

the, the results showed that firms that addressed hunger prevention experienced a positive change in the market value compared to the firms that initiated other social activities such as disaster relief. The significance of the result underlines the importance of this issue (United Nations Department of Public Information, 2009). However, the relationship between health and education-related social initiatives and the change in firms' market value is negative and insignificant compared to the other social issues.

The comparison highlights the importance of prioritising social issues. In the case of social problems related to health or education, the scale and scope of the contributions of firms are limited. The implementation of health and education services depends largely on government policies and the use of specific resources in infrastructure development (Wang, Li, & Wang, 2018). As firms have economic and business interests, developing adequate resources to address health or educational issues is expensive. The negative relationship may point out that investors seem to be sceptical of firms' investment in these resources. The financial benefits realised through enhanced reputation and legitimacy may be low compared to addressing urgent issues such as disaster relief. In contrast, firms can efficiently run hunger prevention program in partnership with stakeholders as the resource commitment is low. Its immediate impact is greater than addressing other urgent issues such as disaster relief.

As hypothesised, the relationship between proactive social initiatives and firms' market value is positive but insignificant. This relationship can be explained with the concept of consumer behaviour from marketing. Investors invest in a "product" so that they can "consume" it in the future, while consumers invest in a product so that they can use it immediately (Cartwright, 2004). Using donation manipulation, Ellen, Mohr, and Webb

(2000) reveal that consumer reaction to a firm's initiative to provide support when a natural disaster strikes is more positive than providing support for continuing social issues. The authors asserted that support for ongoing issues may create doubt about a firm's self-interest. In the case of the present study, investors may perceive that the objective of proactive social initiatives is only to enhance a firm's reputation and legitimacy, and that its actual substantive impact is difficult to determine. A future research direction is to investigate the contextual factors that influence firms to initiate proactive social initiatives and their impact on firm performance.

The result shows a positive and significant relationship between growth opportunities and the change in firms' market value. The finding is consistent with those of prior studies that have examined the impact of growth opportunities in alliances (Chan et al., 1997) and green supply chain (Bose & Pal, 2012). This study extends the results to social sustainability. Firms with low growth opportunities are likely to take higher risks, due to the expectation of low profitability (Oh et al., 2006); moreover, the high level of resources needed for social initiatives (Mohr & Webb, 2005) can be a risky endeavour for them. In contrast, firms with high growth opportunities have excess cash (Brooke & Oliver, 2005) that they can use for social initiatives.

As predicted, the relationship between financial slack and the change in firms' market value is positive, but the magnitude is insignificant. It means that firms with a high level of financial resources that initiate social sustainability activities in partnership will not be valued by investors. One important point should be noted from previous studies, which have identified a positive and significant relationship between financial slack and the change in market value of firms engaging in social activities, and included environmental performance

as a dimension of social sustainability (Perez-Batres et al., 2012; Voss et al., 2008). Firms that invest in improving their environmental performance and provide verifiable measurements, such as improving their operational efficiency (Chen & Lee, 2017), reducing emissions (Konar & Cohen, 2001) or investing in pollution-reducing technology (Nehrt, 1996), are likely to improve financial performance. Since investors can easily verify these claims, they ascribe more value to these firms because of the savings they report (Hart & Ahuja, 1996). In contrast, this study excluded environmental performance, possibly leading to concern among investors that the effect of socially-responsible actions on a firm's market value is doubtful due to unavailability of verifiable data; for example, to what extent do a firm's donations improve the lives of people whose houses have been flooded how much has the firm's reputation increased, and has this enhanced image improved its sales? A future research avenue is to use surveys to ask consumers whether they value improvements in "environmental" or "people" issues as part of social sustainability.

In contrast to what was hypothesised, the relationship between visibility and the change in firms' market value is negative and significant. Prior studies also reported similar results. Oberndorfer, Schmidt, Wagner, and Ziegler (2013) used DJSI inclusion as a proxy of visibility, found a negative and significant relationship with firms' market value. Durand, Paugam, & Stolowy (2019) found DJSI inclusion has no effect on the firms' market value. This study used a different measure, applied to a social context and found similar results. It is worth mentioning that improving the firm's visibility by including in the DJSI index is considered non-productive without creating economic benefits (Oberndorfer et al., 2013). Similarly, performing repeated social activities leads to additional costs without creating additional

business value (López et al., 2007). Hence, a firm attempting to improve its visibility by doing more social activities may be penalised by investors.

6.6 Theoretical and managerial implications

Past studies have found firms that demonstrated social responsibility improved their reputation and legitimacy (Dai et al., 2016; Miller et al., 2018; Saeidi et al., 2015; Tischer & Hildebrandt, 2014). Reputation and legitimacy are resources, have VRIN characteristics, provide firms with competitive advantage and improved financial performance (Russo & Fouts, 1997; Acquaah, 2003). While prior studies have included both environmental and social activities to evaluate a firm's level of social responsibility (e.g. Groening & Kanuri, 2013; Pérez et al., 2019; Price & Sun, 2017), this study differed in only focusing on socially-responsible activities.

A key question asked was: do firms that address social issues with internally-developed resources generate more or less value than firms that partner with stakeholders to address similar social issues? The results are surprising. Addressing social issues, whether using internal resources or in partnership, did not influence financial performance, measured as the change in market value. This raises three questions. First, is there any difference between the reputational value generated by addressing environmental or social issues? If yes, then how do firms that address only social issues, whether with or without partnership, generate a reputational resource? Second, is there "reputational scale"- for example, addressing only social issues will result in a low/medium/high level of reputation, allows firms to generate a low/medium/high level of competitive advantage? Presently the reputation scale includes both environmental and social performance (Walsh & Beatty, 2007). Third, is the effect of reputation contextual, so that firms existing in different

operating environments are evaluated differently? Unfortunately, the present study fails to explain any of these questions. Future studies can use primary data, for example, survey or case studies, to understand the implications of firms that address only social issues and how this focus affects a firm's reputation and financial performance.

This study provides three implications for managers. First, managers should focus on critical social issues, for example, hunger prevention. Instead of addressing several social problems, firms can form consortiums for managers to help them identify potential partners to match the requirement of the society. Second, the findings advises managers to be cautious while spending financial resources on a range of social issues to improve their visibility. Managers can identify critical social issues, allocate and distribute funds maybe once in a year or every six months and report measurable outcomes, for example, the number of people fed in the last quarter. This may improve further firms' legitimacy and the remaining funds can be used for improving internal capabilities to produce quality products or services. Third, this study provides empirical support for high growth firms deriving higher financial performance from addressing social issues. High growth firms can address critical social issues in partnership and be wary of spending excessive financial resources on several social issues.

6.7 Conclusion and limitations

Drawing on signalling theory (Spence, 1974), RBV (Barney, 1991), and RDT (Pfeffer & Salancik, 2003), this study examined whether initiating social activities leads to the change in the market value of firms. We hypothesised that firms that initiated social activities, without or with partnership with stakeholders, which would change the market value of firms differently. When initiating social activities without partnership provides firms with

control and lowers coordination and transaction costs (Williamson, 1985), partnerships may provide firms with complementary resources to reduce resource commitments. The event study methodology was used to examine the change in the market value of firms that initiated social activities. Two subsample analyses were conducted to examine the difference between the market value of firms that used or did not use partnerships. The results showed no change in the market value of the firms that initiated social activities. The results of two subsample analyses were the same showing no difference in the market value of firms following partnership or without partnership approaches to initiate social activities. Our findings add to the existing body of literature that analyses the financial performance of social initiatives using reputation as one of the predictors. Specifically, the results highlight that the financial outcomes of social initiatives may depend on other resources, and that reputation and legitimacy may not always be beneficial in predicting financial performance.

Our result indicates support for addressing critical social issues, for example, hunger prevention in partnership with stakeholders. Our study found support for high growth firms realise a positive change in the market value when they initiate social activities in partnership. Finally, our result suggests that high visibility leads to a negative change in the market value of firms when they initiate social activities in partnership.

This study primarily has three limitations. First, the analysis used a sample of firms listed in the United States, which may limit the generalisability of the findings, because expectations of firm involvement in socially-responsible activities differ across countries. Future studies can compare the results of this study with samples collected in different countries and regions, for example, Europe or Asia. Second, this study has considered partnership as a holistic mechanism without differentiating between collaboration, strategic

alliances, or joint ventures. Future studies can use primary data, for example, surveys, to analyse how different partnership mechanisms affect financial performances. Third, the current ratio used in this study as a measure of financial slack, which led to banking firms being excluded from the analysis. Future studies could use other measures such as leverage or quick ratio that banking firms usually report to compare the results with this study (Daniel, Lohrke, Fornaciari, & Turner, 2004).

Appendix 1: Validation of effect size and statistical power for the regression analysis

This appendix calculates the effect size and the statistical power to understand the magnitude of difference between variables resulted from the cross-sectional regression analysis. A sample for this analysis is large (578) however, multiple regression results in very low R squared value (0.015) with insignificant F statistic. This may be a concern for the reliability of the results. However, if the effect size is large enough, it is possible to detect a statistically significant difference. Cohen (2013) suggested reporting both the effect size and the statistical significance is essential to fully understand the results.

Using Cohen's (2013) formula provided below as equation (6), the effect size of the independent variables of our cross-sectional regression model is 0.02.

$$f^2 = \frac{R^2}{1 - R^2} \quad (5)$$

Where R^2 is observed R^2 value, obtained from the cross-sectional regression results. Cohen (2013) defined the effect size values near 0.02 as small, near 0.15 as medium, and above 0.35 as large. Based on Cohen's (2013) definition, the effect size of our regression model is small.

Statistical power is the probability of cross-sectional regression analysis that reveals a statistically significant difference between variables when an actual difference between them does exist. If statistical power is high, the probability of determining the difference between variables is also high (Sullivan & Feinn, 2012). Statistical power is calculated as $1 - \beta$, where β is the probability of accepting a false null hypothesis. The statistical power of this analysis is calculated as 0.62, lower than the threshold value of 0.80 as suggested by Cohen

(2013). Had the sample size equal to or more than 900, the statistical power could have been 0.85, higher than the threshold value.

The above analysis confirms that 578 is an inadequate sample size with a low value of effect size and unacceptable statistical power for the present regression analysis. The results recommend increasing the sample size to predict the relationship between the dependent and independent variables with high certainty.

Chapter 7 Overall discussion, contributions, implications, and conclusion

This study advances the literature on supply chain sustainability by investigating the impact of partnership for initiating economic, environmental, and social activities on firms' financial performance, measured as the change in the market value. Prior studies have examined internal partnerships (i.e. cross-functional collaboration) and partnerships with suppliers, customers or NGOs by using surveys, case studies, or mathematical modelling to investigate the economic impact (e.g. cost reduction) of environmental (e.g. green, eco-innovation) or social initiatives (for more detail refer to Chen et al., 2017). In contrast, this study used an event study methodology to examine the impact of partnerships with LSPs, IT providers, customers, and NGOs on three aspects of sustainability: developing IT-enabled logistics service innovations, initiating CE practices, and ameliorating societal challenges.

The overarching finding of this study is that partnership has a varying effect on the financial performance of firms that initiate economic, environmental, and social activities. While the financial performance of firms that initiated economic and environmental activities improved, the same did not occur for firms that carried out social initiatives. The result is consistent with the assumption that trade-offs are necessary to balance the performance of the three pillars of sustainability, contributing to the literature on the impact of sustainable practices of financial performance (Salzmann, Ionescu-somers, & Steger, 2005).

The following sections discuss the findings in more detail. Section 7.1 focuses on how partnering with logistics service providers (LSPs) for IT-enabled innovations influenced economic sustainability, along with discussing managerial implications. Section 7.2 discusses

the impact of CE practices on financial performance and managerial implications; CE practices improve environmental performance. Section 7.3 focuses on discussing how initiating social activities in partnership with stakeholders influences financial performance, and managerial implications are also discussed. Section 7.4 discusses the contributions of this thesis. Section 7.5 outlines policy implications. Section 7.6 discusses limitations and future research, while Section 7.7 concludes the chapter.

7.1 The impact of economic sustainability initiatives and managerial implications

The first sub-research question this research addressed is as follows:

What is the impact of partnership for IT-enabled logistics innovations on the financial performance of firms, and what factors influence it?

Chapter 4 answers this question using a multi-country event study methodology that examined the impact of partnership for IT-enabled innovations on the financial performance of firms. The result revealed that IT-enabled logistics service innovation partnerships increase the market value of logistics service providers. The results are consistent with previous studies which indicate that partnerships make sense when they pay off and serve as driver for LSPs to realise innovation success, measured in terms of revenue growth or increase in the market share (Manion & Cherion, 2009; Adams, Bessant, & Phelps, 2006; Griffin & Page, 1993). In addition, IT-enabled innovations not only account for economic success but affect other performance aspects such as a reduction in environmental pollution or improving resource efficiency. For example, a recent partnership of United Postal Service (UPS), an LSP, with Optoro, an IT company, to offer an innovative service to retailers and manufacturers to optimise transportation and value addition to the returns and excess inventory (UPS, 2016), explains how partners can use and combine resources to address

economic and environmental sustainability goals. In this case, UPS brings wide and rich operational and logistics expertise to the partnership, while Optoro's software platform maximises recovery value and reduces environmental waste (UPS, 2016). This is a win-win solution for both partners that set up a partnership to improve financial performance while creating a positive environmental impact.

The increase in the market value of LSPs is moderated by firm size, and smaller logistics providers derive more benefit than large firms. In contrast to previous studies which argued that LSPs should partner with their customers when developing innovations, this study did not find support for this claim. Instead, partnership with other LSPs was found to be financially beneficial. Although partnership with customers to innovate IT-enabled services did not increase the market value, it provides LSPs with an opportunity to understand and align customers' requirements with service innovations. Partnership experience does not affect market value changes. The use of partnerships to develop IT-enabled solutions and financial performance benefits small logistics companies. They should, therefore, offer IT-enabled services to their customers, but identify partners with whom they can partner to develop such IT-enabled service innovations.

7.2 The impact of environmental sustainability initiatives and managerial implications

The second sub-research question this research addressed is as follows:

What is the impact of partnership for circular economy (CE) initiatives on the financial performance of firms, and what factors influence it?

A multi-country event study is used to investigate the impact of firms' partnership initiatives of CE activities on their financial performance in Chapter 5. The result shows that CE partnership initiatives increase the market value of the firms. Prior studies have observed

a positive increase in the market value of the firms that have reported environmental benefits such as improvement in operational efficiency (Chen & Lee, 2017) or reduction in emissions (Konar & Cohen, 2001) or investing in pollution-reducing technology (Nehrt, 1996). In this line of thought, CE initiatives improve environmental performance due to reduced use of energy and virgin raw material. For example, Cusenza, Guarino, Longo, Ferraro, and Cellura (2019) found that reuse of used batteries in residential buildings as stationary storage systems can enhance overall environmental sustainability. Another study used life cycle assessment (LCA) to the replacement of the new petrochemicals with mineral fillers which lowered the environmental impacts by an average of 12%, and recycled plastic after use decreased further emissions to 29%. (Civancik-Uslu, Puig, Voigt, Walter, & Fullana-i-Palmer, 2019). The perceived reduction in the environmental impact resulting from initiating CE activities in partnerships may be one of the reasons for an increase in the market value.

One of the main firm-level factors which moderated the change in the market value is financial slack. The result suggests that firms with high financial slack experienced an increase in the market value from initiating CE activities in partnerships, because firms use financial slack to diversify and identify new raw material sources when their innovation output declines. Through partnership, firms combine their respective resources, such as expertise, skills and physical infrastructure, to match waste materials requirements to be used as raw materials to produce new products in which external funding may be useful; this was viewed positively by the investors (Lungeanu, Stern, & Zajac, 2016).

The results add to the previous studies which highlighted that the lack of financial resources inhibits firms from initiating CE practices (Kirchherr et al., 2018; Mangla et al.,

2018; Masi, Kumar, Garza-Reyes, & Godsell, 2018; Tura et al., 2019). The finding of this study reveals a firm's capability to arrange funds from the market and use them to initiate CE practices in partnership improves its financial performance.

7.3 The impact of social sustainability initiatives and managerial implications

The final sub-research question this research addressed is as follows:

What is the impact of partnership for social initiatives on the financial performance of firms, and what factors influence it?

Chapter 6 outlines and assesses how partnership for social initiatives affected the financial performance of firms. The result indicates no change in the market value of firms that initiated social activities in partnership. Prior studies reported similar results (Bird, Hall, Momentè, & Reggiani, 2007; Jacobs, Singhal, & Subramanian, 2010; Schröder, 2007). The reason may be that these initiatives do not justify the resources required to carry out these activities, and the benefits gained.

Further analysis found that the market value of firms that carried out hunger prevention has increased while firms that concentrated on increasing visibility through repeated social activities have experienced a decrease in the market value. Firms with high growth potential have experienced a market value rise. Although a holistic effect of partnership for initiating social activities on the financial performance is negligible, firms may still derive benefits, for example, by investing in hunger prevention programs. If high growth firms invest in hunger prevention and strategically manage their visibility they may increase their financial performance from initiating social activities in partnership.

7.4 Contributions

This study's first contribution is to demonstrate that partnerships are financially beneficial for firms that initiate activities that target economic and environmental

sustainability. The results suggest that economic and environmental initiatives are clearly related to enhanced financial performance, but social initiatives are not. Prior studies have emphasised the inclusion of sustainability aspects into business strategies (Engert & Baumgartner, 2016; Lloret, 2016; Martina, 2012). The findings of this study support this claim and affirm that it is important for firms to adopt strategic approaches to enhance financial performance with regard to economic, environmental and social activities.

One approach is to create value through partnerships with logistics service providers (LSPs), competitors, suppliers, NGOs, government organisations, and customers. However, partnerships have a varying level of impact on firm financial performance. Specifically, firms that have long-term relationships with LSPs that help them develop innovative IT-enabled services improve their financial performance, influencing the economic sustainability of the LSPs in turn. A recent report claims that partnering firms derive benefits from LSPs' increased financial performance as LSPs improve their service offerings that influence partnering firms' operational efficiency, leading to increased customer satisfaction and revenue (Langley & Infosys, 2019). Additionally, firms that developed partnerships with other organisations to initiate CE practices to reduce reliance on virgin materials experienced an increase in financial performance due to savings and improved environmental performance. Recent studies have reported that CE initiatives influence environmental performance (Civancik-Uslu et al., 2019; Guarino et al., 2019). Firms did not realise financial benefits against initiating social activities, except if they addressed hunger prevention.

The study's second contribution is that trade-offs may be necessary for addressing the three pillars of sustainability, as shown in Table 35. Although all three studies used different samples, they estimated the stock market reactions of partnership for economic,

environmental and social sustainability activities. These activities correspond to logistics, use of resources for production, and social activities. If we look at these activities from a firm's perspective, partnerships for initiating CE practices resulted in the highest abnormal returns (1.01%), followed by developing IT-enabled logistics services (0.80%) and social initiatives (0.03%). Since initiating social activities in partnership resulted in insignificant abnormal returns, firms that are keen on addressing social issues will have to sacrifice some of their profits.

Table 35: Abnormal returns obtained from the three studies

	IT-enabled service innovations	Circular economy initiatives	Social initiatives
Abnormal returns	0.80% (Statistically significant)	1.01% (Statistically significant)	0.03% (Statistically insignificant)

The results are consistent with previous studies which argued that engaging in social initiatives may not improve financial performance (Hassan & Romilly, 2018; Esfahbodi, Zhang, & Watson, 2016; Dyllick & Hockerts, 2002; Spangenberg, 2004). However, a necessary corollary to this is that better financial performance is necessary to address sustainability (Wassenhove, 2019), because good financial performance equips firms to procure and allocate resources to address processes that may cause a negative impact on the environment and the society in future, influencing firms' long-term survival. For example, a firm's successful CE initiative not only ensures raw material supply in the future, resulting in savings, but also creates new jobs (MacArthur, 2013). However, CE implementation can be achieved only by ensuring resources such as knowledge, skills, IT and physical infrastructure, that can allow the firms to operate in a similar way in the future.

Good financial performance, for example, achieved through innovative IT-enabled logistics services, ensures firms have resources to create value in the future by initiating environmental and social activities and vice versa. While some resources contribute towards competitive advantage leading to an increase in firm performance, other resources may not. For example, financial resources required for social initiatives may not increase firm performance (Chapter 6); however, knowledge and skills used to reduce environmental impact enhance firm performance (Chapter 5).

Based on the findings discussed above, firms need to think strategically how they can optimise their focus on the three pillars of sustainability alongside their financial performance. Working in partnership with LSPs, a firm can address the three pillars while also improving their own financial performance. Initiating CE practices in partnership provides ample opportunities for managers to improve financial performance while enhancing environmental performance. However, the main issue is to operationalise the collection and storage of reverse material flows (Bressanelli, Perona, & Saccani, 2019). Managers can allocate organisational resources towards creating closed-loop material flows in partnership with LSPs using innovative IT-enabled solutions. Similarly, firms can use partnership with NGOs and LSPs to develop innovative solutions to improve local food production and distribution using ICT to address food insecurity issues.

Based on the findings of this study, the top management of partner firms can plan a strategic sequence of projects, which will allow firms not only to create value in each of their three pillars of sustainability, but to improve their financial performance at the same time, or at the least, not affect it negatively (for example, in the social pillar investigated in Chapter 6). This has not been demonstrated in previous studies.

The study's third contribution is the development of a framework for studying sustainability initiatives (Figure 13). Prior sustainability research has been fragmented across multiple disciplines, different levels of analysis (e.g. firm, inter-firm, industry), and various foci (e.g. environmental, social). The framework developed here is based on the findings and conceptualisation in the three studies, and attempts to integrate the various aspects of sustainability research. In short, the framework argues that firms require resources and partnerships to execute different types of sustainability activities, and these activities are carried out to ensure the environments firms operate in continue to flourish, from the perspectives of both resource availability as well as legitimacy. The framework is described in more detail below.

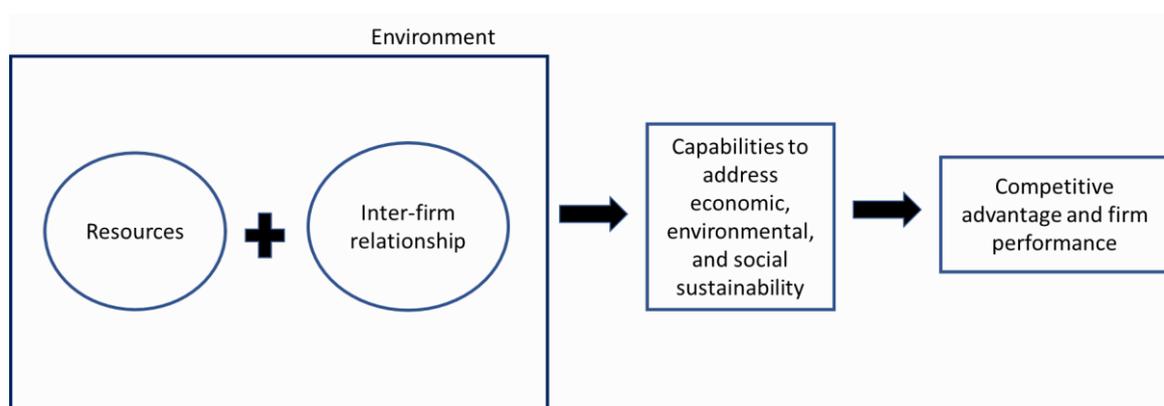


Figure 13: Integrated framework for studying firm sustainability

Firstly, the study points to the importance of tangible, intangible (e.g. knowledge), and natural resources in developing the three levels of strategic capabilities that are relevant for achieving environmental sustainability, following the RBV (Barney, 1991) and NRBV (Hart, 1995) theories. Secondly, firms that do not control the required resources to become sustainable can access those resources by forming partnerships with the firms that do possess those resources. The importance of such relationships is explained by the SDL

(Vargo & Lusch, 2016), the relational view of the firm (Dyer & Singh, 1998), and the RDT (Pfeffer & Salancik, 2003). Finally, the environment's role has three aspects: firms act: a) to ensure the natural environment they operate in remains viable so they can continue existing; b) in response to the dominant discourse in the form of customer demands, government regulations, and pressure from non-governmental organisations; and c) to signal to their investors and other stakeholders that they are legitimate market participants. By integrating the specific roles of resources and relationships and by specifying the roles of the natural and communicative aspects of an environment, the framework can be used to organise existing sustainability research and to detect opportunities for future research. For example, what sort of resources and relationships are needed for each level of the environmental sustainability strategic capabilities? Do firms communicate different sustainable activities the same way or differently, and how?

7.5 Policy implications

This section summarises the policy implications for the three studies. Small logistics firms are willing to offer IT-enabled innovative services but are unable to do so due to limited resources, competition from large firms, and low margins (Busse, 2010). The findings of this study emphasise the linkage between partnerships for IT-enabled logistics innovation and financial performance that provides a strong case for developing policies to foster an "innovation climate" to reap the benefits of innovation. Government-sponsored R&D projects and providing tax preferences may drive small LSPs to identify and form partnerships to improve innovation performance (Shinkle & Suchard, 2019).

Market liberalisation, including reducing trade barriers and standardising logistics rules, would provide firms with opportunities to extend market reach and acquire new capabilities

by sharing knowledge with other firms. For example, the ten countries of the Association of Southeast Asian Nations (ASEAN) have made a policy decision to open up and integrate their logistics sectors to eliminate all restrictions from ASEAN logistics service suppliers to provide logistics services (Tongzon, 2011). This type of agreement enables logistics firms to acquire resources and innovate to satisfy the increasing demands of customers resulting from favourable business environment and fewer restrictions on the flow of material, information, and finances.

The development of state-of-the-art IT-enabled logistics infrastructure to encourage innovation in the logistics industries should be another key aspect of policy. In Singapore, for example, the government is encouraging multi-nationals as well as small and medium-sized enterprises to set up partnerships with research institutions and develop initiatives to leverage the full potential of technological innovations such as autonomous vehicles and big data (Lam & Olliveir, 2017). Further, the government is also investing in the advanced Logistics Hub with a multi-storey Inland Container Depot (ICD), a powerful crane facility, a multi-locator logistical hub and a heavy vehicle fleet (Lam & Olliveir, 2017). Hence, logistics partnerships strengthen the IT-enabled service innovation process, which in effect impacts innovation success positively. The effect of innovation in partnership could be further improved by providing an innovation climate to strengthen strategic relationships with the key supply chain partners.

The policy implications for the implementation of CE practices entails developing a partnership environment and helping firms arrange financing. The results of the second study suggest that partnerships for CE initiatives improve financial performance. However, implementing CE practices requires significant investments in several areas ranging from

developing recycling infrastructures to supporting small and medium scale firms. As an estimate, US\$3.5 trillion will be required by 2050 only to build clean energy infrastructure (Freke, 2019). Hence, government and financial institutions can play a crucial role in promoting and organising industry and other organisations' actions, using their power and resources to organise and mobilise actors from different industries to promote comprehensive CE solutions.

On the local level, governments can stimulate cross-sector partnership and industrial symbiosis by changing legislation that prevents firms from forming partnerships. For example, China maintains several industrial symbiosis parks, which use circular economy concepts, mainly reusing and recycling materials like plastics to improve environmental sustainability and reduce natural raw material consumption.

Financial institutions can also contribute to the development of CE practices. The finding of the second study suggests that the ability of low growth firms to raise funds through debt for initiating CE practices in partnership is associated with an increase in the market value. Banks can offer such firms credit instruments like loans or bonds to link the CE performance with interest rates; for instance, if CE performance improves, the interest rate decreases. Alternatively, non-commercial development institutions can offer grants or government-supported financial instruments with low requirements for generating returns compared to commercial institutions (Lacy, 2020).

The policy implications of the third study suggest that firms, NGOs, and government should form partnerships to address food insecurity. As the global problem of food insecurity increases, governments should aim to reduce hunger over the next 15 years, as suggested by the UN's Sustainable Development Goal 2 (SDG). Governments should align

their state policies with SDG 2 and adopt a “best practices” approach to improve food distribution policies. Governments may collaborate with NGOs and firms to create policies to improve the ability of poor people to access food. An example of such a policy is providing tax benefits or favourable regulations to firms actively involved in hunger prevention programs.

Firms may collaborate with supermarkets and government institutions to develop a database to link registered poor people with supermarkets to inform them about food products nearing the expiration date. Supermarkets can offer those products at the lowest prices or for free, depending on the terms agreed with the participating firms; this will reduce food losses and also address food insecurity issues. Participating firms will improve visibility and accountability, and reduce costs associated with philanthropic activities. The benefit for governments is improving their ability to precisely track food consumption patterns and develop strategies to improve food distribution policies.

7.6 Limitations and future research

While this thesis improves our understanding of sustainability, it includes certain limitations, as with all research.

First, the samples comprised publicly-listed firms, because the goal was to understand investors’ responses to announcements. Thus, it is possible that the research findings may not be generalised for non-listed firms. Future studies may use surveys to collect data from non-listed firms and compare the results with this study.

Second, despite careful efforts to collect the samples, there is also a possibility that some events may have been missed - a common risk with the event study methodology (Binder, 1969). Perhaps, due to resource constraints, not all possible events were identified, as only

one database was used to collect announcements for all three studies. Future studies may use several databases to generate their sample to compare the results with this study.

Third, while the keywords used to search for announcements have been wide-ranging, drawn from the literature review and vetted by independent researchers, mistakes with the keywords or keywords that were missed would reduce the power of the results.

Fourth, the financial impact of sustainability events cannot be captured fully by analysing the change in the abnormal returns as it is not possible to collect every announcement related to each event. Thus, the event studies may have overestimated or underestimated the financial impact of some of the events. However, it is worth noting that the objective of this study was not to calculate the precise financial impact of a particular type of sustainability event. Alternatively, the study aimed to estimate and compare the change in the abnormal returns of various types of sustainability events. Thus, drawing conclusions regarding the impact of partnership capabilities to address sustainability issues may essentially be investors' evaluation. Nevertheless, this is the first study to examine the impact of partnership for initiating IT-enabled innovation, CE practices, and addressing critical social activities on financial performance using objective data. Future studies may use either surveys or case studies to understand managers' views on using partnership for sustainability for improving financial performance.

Fifth, although an event study methodology is straight forward, rigorous, and robust, factors such as organisational culture, laws and regulations of different countries, and negotiation approaches cannot be captured by event studies. Hence, qualitative methods, such as case studies or focus groups, would be appropriate to probe questions such as which

contingency factors influence the willingness and openness of firms to set up partnerships for sustainability initiatives.

Sixth, another limitation was to identify the use of different types of resources (physical, knowledge, financial) in the sustainability partnership and estimate how each type of resource affected the stock market reaction. Different resources may have a different impact on the stock market. This research estimated the overall impact of partnership and has assumed that partners have access to resources in order to address the specific pillar of sustainability. Future studies can use case studies to understand how firms identify partners with specific resources and use those resources to achieve their sustainability goals and how those resources have impacted their firm performance.

Finally, subjective measures, such as level of communication or cultural fit (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004; Ozorhon, Ardit, Dikmen, & Birgonul, 2008), may affect the performance of partnerships. This study did not measure the long-term impact of partnerships as it was not possible to confirm whether partnership events used in this study were eventually successful. Future studies, using longitudinal case studies, may wish to investigate where positive financial performance realised in this study holds in the long run. Another interesting future research avenue is to identify conditions and factors that drive firms to form repeated partnerships with the same firm.

There are also several theoretical issues to consider for future research. First of all, research is necessary to understand the role of human capital (Hatch & Dyer, 2004) to identify and use other inter-firm resources and relationship structures to gain a competitive advantage. As firms move to become sustainable, a firm's human capital should focus on creating strategic value by identifying and using suitable inter-firm resources to

improve performances on the three pillars of sustainability and financial performance (Colbert & Kurucz, 2007). Secondly, communication between firms is essential to enhance the use of inter-firm resources and for the relationship to become sustainable. IT is critical for collaboration, communication, and sustainability capabilities (Ray, Muhanna, & Barney, 2005). IT resources integrate human capital with other resources to develop sustainability capabilities. Future studies can examine how communication enabled by different IT resources contribute to firms' overall sustainability goals and attaining competitive advantage. Finally, learning from past sustainability performance is important to improve inter-firm resource usage and relationship performance. It may be interesting to investigate how firms procure, change or implement other resources when they do not realise desired sustainability goals in partnership. Future studies could use social exchange theory (Emerson, 1976) or social network theory (Granovetter, 1973) to examine how firms adapt and respond to such challenges through their social relationships and the social capital development. Another interesting research avenue is to understand organisational responses when sustainability goals are not achieved in partnership, and how this outcome influences future sustainability actions.

7.7 Conclusion

This study fills a research gap by examining the relationship between partnerships for initiating activities to address economic, environmental, and social issues and firms' financial performance, measured as the change in the market value. Contemporary studies underscore the importance of integrating economic, environmental, and social performances into business processes. However, they do not explain how firms can balance the overall sustainability performance. Hence, firms attempt to improve environmental and

social performance at the cost of economic performance. This may be one of the reasons of unsustainability as firms cannot improve environmental and social performance without improving financial performance. This research highlights that firms can adopt alternative approaches to improve all three dimensions of sustainability and improve financial performance simultaneously.

After analysing the impact of partnership for initiating sustainability activities on financial performance, this study suggests three alternative approaches. Firstly, firms can develop IT-enabled innovations in partnership with LSPs to enhance operational efficiencies, reputation, and savings to improve economic sustainability. Secondly, firms can initiate CE practices in partnership to improve both their financial as well as environmental performance. Finally, firms can improve social sustainability as well as their financial performance by setting up partnership with NGOs to address critical social issues, for example, hunger prevention. Therefore, firms need to develop a strategy for identifying, selecting and fostering partnerships to access and exchange inter-firm resources to address the three dimensions of sustainability strategically.

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