



Sant'Anna
Scuola Universitaria Superiore Pisa



DYNAMIC CAPABILITIES AND BEHAVIORAL PRACTICES OF ORGANIZATIONS FOR CIRCULAR ECONOMY IMPLEMENTATION

Owais Ur Rehman Khan
Academic Year: 2020



INSTITUTE
OF MANAGEMENT



Scuola Superiore
Sant'Anna

 **FACULTY OF
BIOSCIENCE ENGINEERING**

DYNAMIC CAPABILITIES AND BEHAVIORAL PRACTICES OF ORGANIZATIONS FOR CIRCULAR ECONOMY IMPLEMENTATION

A dissertation submitted by

Owais Ur Rehman Khan

in partial fulfillment of the requirements for the double degree of

**Doctor of Philosophy: Management, Innovation, Sustainability and Healthcare
and**

Doctor of Bioscience Engineering: Environmental Sciences and Technology

under the mentorship of

Asst. Prof. Dr. Tiberio Daddi

Institute of Management
Scuola Superiore Sant'Anna

and the supervision of

Prof. Dr. Fabio Iraldo

Institute of Management
Scuola Superiore Sant'Anna

Prof. Dr. ir. Steven De Meester

Dept. of Green Chemistry and Technology
Ghent University

in the academic year of 2020

DECLARATION

I declare that this doctoral thesis is composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or professional qualification except as specified.

I declare that the following parts of this doctoral thesis are already submitted and/or published in peer-reviewed journals. My contribution and those of the other authors in these publications are explicitly indicated.

The work presented in Chapter 2 was published in January 2020:

Khan, O., Daddi, T., & Iraldo, F. (2020). Microfoundations of dynamic capabilities: Insights from circular economy business cases. ***Business Strategy and the Environment***, 29(3), 1479–1493. <https://doi.org/10.1002/bse.2447>

The work presented in Chapter 3 was submitted in February 2020:

Khan, O., Daddi, T., & Iraldo, F. (submitted). Sensing, seizing, and reconfiguring: Key capabilities and organizational routines for circular economy implementation. ***Journal of Cleaner Production***

The work presented in Chapter 4 was published in August 2020:

Khan, O., Daddi, T., & Iraldo, F. (2020). The role of dynamic capabilities in circular economy implementation and performance of companies. ***Corporate Social Responsibility and Environmental Management***, 1–16. <https://doi.org/10.1002/csr.2020>

The work presented in Chapter 5 was published in August 2020:

Khan, O., Daddi, T., Slabbinck, H., Kleinhans, K., Vazquez-Brust, D., & De Meester, S. (2020). Assessing the determinants of intentions and behaviors of organizations towards a circular economy for plastics. ***Resources, Conservation and Recycling***, 163, 105069. <https://doi.org/10.1016/j.resconrec.2020.105069>

Owais Ur Rehman Khan

30 September 2020

ACKNOWLEDGMENTS

This doctoral thesis is the output of the effort and support of several people to whom I am extremely grateful.

First and foremost, I would like to thank my mentor and supervisors, Asst. Prof. Tiberio Daddi, Prof. Fabio Iraldo, and Prof. Steven De Meester. It has been a privilege and a great experience to work with you all.

Above all, I would like to express my deepest gratitude to my mentor. Tiberio, you have been invaluable to me not only on an academic level but also on a personal level. Although words are certainly not sufficient to express how much I am indebted to you, I am not shy to admit that if you had not provided me this opportunity, I might not have been ever privileged to pursue Ph.D. This doctoral thesis would not have been possible without your patience, encouragement, tremendous support, and friendly guidance. I once heard that “not the doctoral thesis, rather a doctorate candidate is the product of a mentor”. Before meeting you, I did not even know the existence of the theory of dynamic capabilities. You did not only introduce me to this concept, but you eventually made me a more dynamic person, and therefore I practically sensed and then seized the joint Ph.D. opportunity. I have been now reconfiguring my skills and expertise.

Next, I would like to express my deepest gratitude to my both supervisors. Steven, this doctoral thesis would not have been completed without your patience, insightful discussions, and expertise on the subject. You contributed to turning my dream into a reality. You did not only accept my request for a joint Ph.D., but you allowed me to learn materials flow analysis (MFA) and life cycle assessment (LCA), which could provide a competitive advantage in my career. I would certainly remain indebted to you. Fabio, you have been invaluable to me on both an academic level and an administrative level. You gave me the freedom to explore ideas and you always believed in my research work. You gave me courage and inspiration throughout this journey. You always eased my path and never objected to my requests related to administrative matters. I could not have found a better supervisor than you.

I also would like to thank my other co-authors of a research paper presented in this doctoral thesis. Kerstin Kleinhans, Hendrik Slabbinck, and Diego Vazquez-Brust, I am delighted to have worked with you and I look forward to working with you again.

I also would like to thank other professors and staff for their encouragement and assistance throughout this journey. Instead of listing their names and forgetting an important few, I am indebted to all of them. I am also thankful to my classmates. Ilaria Corazza and Lucrezia Coletta, your encouragement and friendly company often eased my worries. We together passed through this journey. We did not only sympathize with each other by sharing our deep anxiety in frustrating situations, but we also enjoyed the excitement of this journey.

Last but not the least, I am heartily thankful to my wife and daughter for their unconditional love, support, and attention. Sahar Owais, you have been my savior in tough times. I am indebted to your sacrifices and patience throughout this journey. I know it was very difficult for you not only to be living far from your family but also to be lonely throughout the days while I was busy in writing research papers and this doctoral thesis. Ayeza Khan, you are my love and absolute joy that brings happiness to me every second.

Finally, my deep and sincere gratitude to my mother and father, Ishrat Nafees and Nafees Ur Rehman Khan, for their unparalleled love and continuous support. You gave me unequivocal support throughout, as always, for where my mere expression of thanks likewise does not suffice. I am forever indebted to both of you for providing me the opportunities and experiences that have made me who I am. You selflessly encouraged me to explore new directions in life and seek my destiny. This journey would not have been possible without your sacrifices and prayers, and therefore I dedicate this milestone to both of you. Even though we are physically distant, you are always in my heart. I will always do my best to make you proud.

Owais Ur Rehman Khan

30 September 2020

ABSTRACT

Humans have been consuming 70% more natural resources each year than the regenerative capacity of the Earth and thus causing several environmental problems. If this consumption pace continues in a linear economy approach (take-make-dispose), humans would need 200% more natural resources by 2050 due to the increase in global ecological footprint. In this scenario, many organizations (businesses) would not be able to survive. For instance, organizations from the manufacturing sector whose production heavily depends on scarce materials would have to temporarily shut down their production due to a lack of resources or supply disruptions. These organizations would not be able to compete with other organizations that are less dependent on resources, and they would be at high risk of losing their brand value and customer loyalty due to their bad ecological footprint.

Scholars and practitioners are continuously awakening organizations that the concept of a circular economy (CE) is not just an alternative economic model rather a necessity to sustain and improve human life. Organizations have been now slowly realizing that CE is indeed vital for the viability and sustainability of their business. The EU and several national governments have already introduced various initiatives to support organizations in the transition towards CE. Yet many organizations are not easily able to translate the concept of CE into their corporate strategies, business models, and operations. Many organizations are either facing barriers or still unclear how they may transition to CE. The existing literature on CE from the perspective of management studies is still in its infancy. Whereas, the tools and methodologies mentioned in the grey literature are too generic and insufficient for an organization to adopt CE. To the best of our knowledge, there is still no or very little academic discussion on how organizations can implement CE. Furthermore, there is limited empirical support of whether CE is beneficial for organizations from a business perspective.

Using the theory of dynamic capabilities and the theory of planned behavior, this doctoral thesis attempts to explore:

- How organizations can identify and pursue CE opportunities?
- Which are the key capabilities and organizational routines for CE?
- Do dynamic capabilities and CE implementation improve the overall performance of organizations? And do the circular dynamic environment influence CE implementation?

- What factors cause the intention-behavior gap? And how organizations can attain a CE for plastics?

This doctoral thesis concludes that organizations can accomplish CE through their dynamic capabilities (sensing, seizing, and reconfiguring). Organizations may identify CE opportunities through four microfoundations of sensing, namely (1) market monitoring and technology scanning, (2) idea generation, (3) knowledge creation, and (4) experiential learning. Once a CE opportunity is sensed, organizations may address that opportunity through three microfoundations of seizing, namely (1) strategic planning, (2) business model and governance, and (3) collaboration, and four microfoundations of reconfiguring, namely (1) organizational restructuring, (2) technological upgradation, (3) knowledge integration, and (4) best practices adaptation.

This doctoral thesis identifies that key capabilities and routines that an organization should develop and apply for CE objectives include, but not limited to, undertaking R&D to try out new ideas, conducting LCA to assess potential environmental impacts of products, planning investments and human resources, finding strategic partners, changing organizational structure, introducing new technology, and adopting new business practices.

This doctoral thesis concludes that dynamic capabilities and their underlying organizational activities significantly facilitate CE implementation, which consequently improves the overall performance of organizations. That is, CE implementation does not only improve environmental and financial performance but also competitiveness and corporate reputation. Furthermore, this doctoral thesis cautiously concludes that a circular dynamic environment may positively influence the transition towards CE.

This doctoral thesis concludes that the majority of organizations are still far away from contributing to CE for plastics. There are various factors (barriers) that cause the gap between intentions and behaviors of organizations towards CE for plastics. These barriers include lack of easy access, lack of space and time, lack of skilled personnel, insufficient funds, and so on. Finally, this doctoral thesis suggests some measures to overcome the intention-behavior gap and to attain a CE for plastics.

ABSTRACT

(in Italian language)

Gli esseri umani consumano il 70% in più di risorse naturali ogni anno rispetto alla capacità rigenerativa della Terra, causando così diversi problemi ambientali. Se questo ritmo di consumo continua secondo un modello di economia lineare (take-make-dispose), gli esseri umani avrebbero bisogno del 200% in più di risorse naturali entro il 2050 a causa dell'aumento dell'impronta ecologica globale. In questo scenario, molte organizzazioni (aziende) non sarebbero in grado di sopravvivere. Ad esempio, le organizzazioni del settore manifatturiero la cui produzione dipende fortemente dalla scarsità di materiali dovrebbero interrompere temporaneamente la produzione a causa della mancanza di risorse o di interruzioni della fornitura. Queste organizzazioni non sarebbero in grado di competere con altre organizzazioni che dipendono meno dalle risorse e sarebbero ad alto rischio di perdere il valore del marchio e la fedeltà dei clienti a causa della loro cattiva impronta ecologica.

Studiosi e professionisti stanno continuamente sensibilizzando le organizzazioni sul tema dell'economia circolare (EC), che rappresenta non solo un modello economico alternativo, bensì una necessità per sostenere e migliorare la vita umana. Le organizzazioni stanno ora realizzando lentamente che l'EC è davvero vitale per la fattibilità e la sostenibilità della loro attività. L'UE e diversi governi nazionali hanno già introdotto varie iniziative per supportare le organizzazioni nella transizione verso l'EC. Tuttavia, molte organizzazioni non sono in grado di tradurre facilmente il concetto di EC nelle loro strategie aziendali, modelli di business e attività. Molte organizzazioni stanno affrontando barriere o sono ancora incerte su come passare all'EC. Relativamente agli studi manageriali, la letteratura esistente sull'EC è ancora agli albori. Inoltre, gli strumenti e le metodologie menzionati nella letteratura grigia sono troppo generici e insufficienti per consentire ad un'organizzazione di adottare una EC. Per quanto a nostra conoscenza, non esiste ancora, o è ancora molto scarsa, una discussione accademica su come le organizzazioni possono implementare una EC. Inoltre, esiste una limitata evidenza empirica sul vantaggio in termini di business che l'adozione di una EC potrebbe portare alle organizzazioni.

Utilizzando la teoria delle capacità dinamiche e la teoria del comportamento pianificato, questa tesi di dottorato tenta di esplorare:

- In che modo le organizzazioni possono identificare e perseguire le opportunità di EC?
- Quali sono le capacità chiave e le routine organizzative per una EC?
- Le capacità dinamiche e l'implementazione di una EC migliorano le prestazioni complessive delle organizzazioni? E l'ambiente dinamico circolare influenza l'implementazione di una EC?
- Quali fattori causano il divario intenzione-comportamento? E come possono le organizzazioni ottenere una EC per la plastica?

Questa tesi di dottorato conclude che le organizzazioni possono ottenere una EC attraverso le loro capacità dinamiche (rilevamento, sfruttamento e riconfigurazione). Le organizzazioni possono identificare le opportunità di EC attraverso quattro micro-fondamenti di rilevamento, ossia (1) monitoraggio del mercato ed esplorazione delle tecnologie, (2) generazione di idee, (3) creazione di conoscenza e (4) apprendimento esperienziale. Una volta rilevata un'opportunità di EC, le organizzazioni possono cogliere tale opportunità attraverso tre micro-fondamenti di sfruttamento, ossia (1) pianificazione strategica, (2) modello di business e governance, e (3) collaborazione e attraverso quattro micro-fondamenti di riconfigurazione, ossia (1) ristrutturazione organizzativa, (2) aggiornamento tecnologico, (3) integrazione della conoscenza e (4) adattamento delle migliori pratiche.

Questa tesi di dottorato scopre che le capacità e le routine chiave che un'organizzazione dovrebbe sviluppare e applicare ai fini di una EC includono, ma non si limitano a: intraprendere attività di ricerca e sviluppo per testare nuove idee, condurre una valutazione del ciclo di vita (LCA) per valutare i potenziali impatti ambientali dei prodotti, pianificare investimenti e risorse umane, trovare partner strategici, modificare la struttura organizzativa, introdurre nuove tecnologie e adottare nuove pratiche di business.

Questa tesi di dottorato conclude che le capacità dinamiche e le loro attività organizzative sottostanti facilitano in modo significativo l'implementazione di una EC, che di conseguenza migliora le prestazioni complessive delle organizzazioni. In altre parole, l'implementazione di una EC non solo migliora le prestazioni ambientali e finanziarie, ma anche la competitività e la reputazione aziendale. Inoltre, questa tesi di dottorato suggerisce

cautamente che un ambiente dinamico circolare può influenzare positivamente la transizione verso un'EC.

Questa tesi di dottorato conclude che la maggior parte delle organizzazioni è ancora lontana dal contribuire a un'EC per la plastica. Ci sono vari fattori (barriere) che causano il divario tra intenzioni e comportamenti delle organizzazioni nei confronti di un'EC per la plastica. Queste barriere includono la mancanza di un facile accesso, la mancanza di spazio e tempo, la mancanza di personale qualificato, fondi insufficienti e così via. Infine, questa tesi di dottorato suggerisce alcune misure per superare il divario intenzione-comportamento e per ottenere una EC per la plastica.

ABSTRACT *(in Dutch language)*

Mensen verbruiken elk jaar 70% meer natuurlijke grondstoffen dan het regeneratievermogen van de aarde en veroorzaken zo verschillende milieuproblemen. Als dit consumptietempo doorgaat in een lineaire economische benadering (take-make-dispose), zou de mens tegen 2050 200% meer natuurlijke grondstoffen nodig hebben vanwege de toename van de wereldwijde ecologische voetafdruk. In dit scenario zouden veel organisaties (bedrijven) niet kunnen overleven. Organisaties uit de verwerkende industrie, waarvan de productie sterk afhankelijk is van schaarse materialen, zouden bijvoorbeeld hun productie tijdelijk moeten stilleggen vanwege een gebrek aan middelen of een onderbreking van de aanbod. Deze organisaties zouden niet kunnen concurreren met andere organisaties die minder afhankelijk zijn van middelen, en ze lopen een groot risico hun merkwaarde en klantloyaliteit te verliezen vanwege hun slechte ecologische voetafdruk.

Wetenschappers en mensen die werken in de praktijk schudden organisaties voortdurend wakker dat het concept van een circulaire economie (CE) niet alleen een alternatief economisch model is, maar eerder een noodzaak om het menselijk leven in stand te houden en te verbeteren. Organisaties realiseren zich nu langzaamaan dat CE inderdaad essentieel is voor de levensvatbaarheid en duurzaamheid van hun bedrijf. De EU en verschillende nationale regeringen hebben al verschillende initiatieven geïntroduceerd om organisaties te ondersteunen bij de overgang naar CE. Desondanks zijn veel organisaties niet gemakkelijk in staat om het concept van CE te vertalen in hun bedrijfsstrategieën, bedrijfsmodellen en operaties. Veel organisaties worden geconfronteerd met belemmeringen of weten nog steeds niet hoe ze kunnen overstappen naar CE. De bestaande literatuur over CE vanuit het perspectief van managementstudies staat nog in zijn kinderschoenen. Terwijl de tools en methodologieën die in de grijze literatuur worden genoemd, te algemeen en onvoldoende zijn voor een organisatie om CE te adopteren. Voor zover wij weten, is er nog geen of zeer weinig academische discussie over hoe organisaties CE kunnen implementeren. Bovendien is er beperkte empirische onderbouwing of CE gunstig is voor organisaties vanuit zakelijk perspectief.

Gebruikmakend van de theorie van dynamische vermogens en de theorie van gepland gedrag, probeert dit doctoraatsproefschrift het onderstaande te onderzoeken:

- Hoe organisaties CE-kansen kunnen identificeren en nastreven?
- Wat zijn de belangrijkste capaciteiten en organisatorische routines voor CE?
- Verbeteren dynamische capaciteiten en CE-implementatie de algehele prestaties van organisaties? En heeft de circulaire dynamische omgeving invloed op de CE-implementatie?
- Welke factoren veroorzaken de kloof tussen intentie en gedrag? En hoe kunnen organisaties een CE behalen voor kunststoffen?

Dit proefschrift concludeert dat organisaties CE kunnen bereiken door hun dynamische capaciteiten (voelen, grijpen en herconfigureren). Organisaties kunnen CE-kansen identificeren door middel van vier microfunderingen van detectie, namelijk (1) marktmonitoring en technologie-scanning, (2) het genereren van ideeën, (3) kenniscreatie en (4) ervaringsleren. Zodra een CE-kans wordt waargenomen, kunnen organisaties die kans aangrijpen door middel van drie microfunderingen van grijpen, namelijk (1) strategische planning, (2) bedrijfsmodel en governance, en (3) samenwerking, en vier microfunderingen van herconfiguratie, namelijk (1) organisatorische herstructurering, (2) technologische verbetering, (3) kennisintegratie en (4) aanpassing aan beste praktijken.

Dit doctoraatsproefschrift identificeert dat de belangrijkste capaciteiten en routines die een organisatie zou moeten ontwikkelen en toepassen voor CE-doelstellingen bevatten, maar niet beperkt tot, het ondernemen van onderzoek en ontwikkeling (O&O) om nieuwe ideeën uit te proberen, het uitvoeren van LCA om mogelijke milieueffecten van producten te beoordelen, het plannen van investeringen en menselijke hulpbronnen, het vinden van strategische partners, het veranderen van de organisatiestructuur, het introduceren van nieuwe technologie en het toepassen van nieuwe bedrijfspraktijken.

Dit proefschrift concludeert dat dynamische capaciteiten en hun onderliggende organisatorische activiteiten CE-implementatie aanzienlijk vergemakkelijken, wat bijgevolg de algehele prestaties van organisaties verbetert. Dat wil zeggen, CE-implementatie verbetert niet alleen de milieu- en financiële prestaties, maar ook het concurrentievermogen en de bedrijfsreputatie. Bovendien concludeert dit doctoraatsproefschrift voorzichtig dat een circulaire dynamische omgeving de transitie naar CE positief kan beïnvloeden.

Dit proefschrift concludeert dat het merendeel van de organisaties nog ver verwijderd is van een bijdrage aan CE voor kunststoffen. Er zijn verschillende factoren (barrières) die de kloof veroorzaken tussen de intenties en het gedrag van organisaties ten aanzien van CE voor kunststoffen. Deze belemmeringen zijn onder meer een gebrek aan gemakkelijke toegang, gebrek aan ruimte en tijd, gebrek aan geschoold personeel, onvoldoende financiële middelen, enzovoort. Ten slotte stelt dit doctoraatsproefschrift enkele maatregelen voor om de kloof tussen intentie en gedrag te overbruggen en om een CE voor kunststoffen te behalen.

TABLE OF CONTENTS

LIST OF FIGURES	i
LIST OF TABLES	ii
LIST OF ABBREVIATIONS	iii
 CHAPTER 1	 1
Introduction of the Dissertation	
1.1. General Background	2
1.2. Key Concepts and Theories	4
1.2.1. Sustainable Development and Circular Economy	4
1.2.2. Theory of Dynamic Capabilities and Resource-Based View	7
1.2.3. Theory of Planned Behavior and Reasoned Action	11
1.3. Research Gaps and Objectives	14
1.4. Research Questions and Approach	18
1.5. Structure of the Dissertation	21
 CHAPTER 2	 24
Dynamic Capabilities of Organizations for Circular Economy: A Multiple-Case Study	
2.1. Introduction	25
2.2. Literature Review	26
2.2.1. Theory of Dynamic Capabilities	26
2.2.2. Dynamic Capabilities in Corporate Sustainability and Circular Economy (CE)	27
2.3. Methodology	30
2.3.1. Cases Selection	30
2.3.2. Data Collection	32
2.3.3. Data Analysis	34
2.4. Findings	36
2.4.1. Sensing	36
2.4.2. Seizing	41
2.4.3. Reconfiguring	44
2.5. Discussion	47
2.6. Conclusion	49
 CHAPTER 3	 52
Key Dynamic Capabilities and Routines of Organizations for Circular Economy Implementation: Evidence from the Manufacturing Sector	
3.1. Introduction	53
3.2. Theoretical Framework and Hypotheses	54
3.3.1. Questionnaire Development	60
3.3.2. Constructs and Measures	60
3.3.3. Data Collection and Analysis	63
3.4. Results	66
3.4.1. Measurement Model	66
3.4.2. Structural Model	74
3.4.3. Importance-Performance Matrix Analysis (IPMA)	76
3.5. Discussion and Implications	80
3.6. Conclusion	85

CHAPTER 4.....	87
The Role of Circular Dynamic Environment and Dynamic Capabilities in Circular Economy Implementation and Performance of Organizations: Evidence from the Manufacturing Sector	
4.1. Introduction.....	88
4.2. Theoretical Framework and Hypotheses.....	89
4.3. Methodology.....	95
4.3.1. Questionnaire Development.....	95
4.3.2. Constructs and Measures	95
4.3.3. Data Collection and Analysis.....	98
4.4. Results.....	101
4.4.1. Measurement Model	101
4.4.2. Structural Model	111
4.5. Discussion and Implications	115
4.6. Conclusion	121
CHAPTER 5.....	122
Behavioral Practices of Organizations towards a Circular Economy for Plastics: Evidence from Various Sectors	
5.1. Introduction.....	123
5.2. Theoretical Framework and Hypotheses.....	125
5.3. Methodology.....	132
5.3.1. Data Collection	132
5.3.2. Constructs and Measures	134
5.3.3. Data Analysis	136
5.4. Results.....	136
5.4.1. Measurement Model	136
5.4.2. Structural Model	144
5.5. Discussion and Implications	146
5.6. Conclusion	151
CHAPTER 6.....	153
Conclusion of the Dissertation	
6.1. Overview.....	154
6.2. Concluding Remarks.....	154
6.2.1. A Brief Roadmap for CE Implementation	154
6.2.2. Key Capabilities and Organizational Routines	156
6.2.3. Circular Dynamic Environment, Dynamic Capabilities, CE Implementation, and Overall Performance	157
6.2.4. Influencing Factors of CE for Plastics	158
6.3. Limitations and Directions for Future Research.....	159
REFERENCES.....	162
APPENDIX-A: Interview Questionnaire.....	181
APPENDIX-B: Survey Questionnaire	183
APPENDIX-C: Survey Questionnaire	187
CURRICULUM VITAE.....	190

LIST OF FIGURES

Figure 1.1: Models of TRA and TPB.....	13
Figure 1.2: Schematic Overview of the Dissertation	23
Figure 2.1: Data Structuration Process	35
Figure 3.1: Research Model (Hypotheses).....	59
Figure 3.2: Hierarchical Measurement Model	62
Figure 3.3: Summary of Results (First Stage: Measurement Model)	81
Figure 3.4: Summary of Results (Second Stage: Structural Model)	82
Figure 4.1: Research Model (Hypotheses).....	94
Figure 4.2: Hierarchical Measurement Model	97
Figure 4.3: Summary of Findings (First Stage: Measurement Model)	116
Figure 4.4: Summary of Findings (Second Stage: Structural Model).....	117
Figure 5.1: Research Model (Hypotheses).....	131
Figure 5.2: Hierarchical Measurement Model	135
Figure 5.3: Summary of Findings	147

LIST OF TABLES

Table 1.1: Main Definitions of Circular Economy (CE).....	6
Table 1.2: Main Definitions of Dynamic Capabilities (DCs)	10
Table 1.3: Outline of Research Approach.....	20
Table 2.1: Description of CE Business Cases.....	31
Table 2.2: Description of Data Sources	33
Table 2.3: Summary of Findings - Sensing.....	39
Table 2.4: Summary of Findings - Seizing	43
Table 2.5: Summary of Findings - Reconfiguring	46
Table 3.1: Description of Sample	64
Table 3.2: Results of Hierarchical Measurement Model	68
Table 3.3: Discriminant Validity (Fornell-Larcker Criterion)	72
Table 3.4: Discriminant Validity (HTMT Criterion)	73
Table 3.5: Hypothesis Testing (Bootstrapping Results)	75
Table 3.6: Results of Importance-Performance Matrix Analysis.....	78
Table 4.1: Description of Sample	99
Table 4.2: Results of Hierarchical Measurement Model (CDE).....	103
Table 4.3: Results of Hierarchical Measurement Model (CE).....	104
Table 4.4: Results of Hierarchical Measurement Model (DCs).....	105
Table 4.5: Results of Hierarchical Measurement Model (PER)	107
Table 4.6: Discriminant Validity (Fornell-Larcker Criterion)	109
Table 4.7: Discriminant Validity (HTMT Criterion)	110
Table 4.8: Hypothesis Testing (Bootstrapping)	113
Table 4.9: Mediation Effect Analysis	114
Table 5.1: Description of Sample	133
Table 5.2: Reliability and Validity of Measurement Model	138
Table 5.3: Discriminant Validity (Fornell-Larcker Criterion)	142
Table 5.4: Discriminant Validity (HTMT Criterion)	143
Table 5.5: Hypothesis Testing (Bootstrapping)	145

LIST OF ABBREVIATIONS

AVE	: Average Variance Extracted
CB-SEM	: Covariance-Based Structural Equation Modeling
CDE	: Circular Dynamic Environment
CE	: Circular Economy
CEOs	: Chief Executive Officers
CR	: Composite Reliability
DCS	: Distributed Control System
DCs	: Dynamic Capabilities
DCV	: Dynamic Capabilities View / Theory of Dynamic Capabilities
DDT	: Dichlorodiphenyltrichloroethane
EMAS	: Eco-Management and Audit Scheme
ERP	: Enterprise Resource Planning
EU	: European Union
HCM	: Hierarchical Component Model
HTMT	: Heterotrait-Monotrait Ratio of Correlations
ICT	: Information Communications Technology
IPMA	: Importance-Performance Matrix Analysis
LCA	: Life Cycle Assessment
NACE	: Nomenclature statistique des Activités économiques dans la Communauté Européenne / Statistical Classification of Economic Activities in the European Community
NFI	: Normed Fit Index
NGOs	: Non-Governmental Organizations
PLS-SEM	: Partial Least Squares Structural Equation Modeling
QCS	: Quality Control System
R&D	: Research and Development
RBV	: Resource-Based View
SDGs	: Sustainable Development Goals
SMEs	: Small and Medium-Sized Enterprises
SOPs	: Standard Operating Procedures
SRMR	: Standardized Root Mean Square Residual
TPB	: Theory of Planned Behavior
TRA	: Theory of Reasoned Action
UN	: United Nations
VIF	: Variance Inflation Factor
VRIN	: Valuable, Rare, Inimitable and Non-Substitutable Resources
WCED	: World Commission on Environment and Development

CHAPTER 1

Introduction of the Dissertation

1.1. General Background

Today whatever we do in our lives, from buying grocery items to the use of electricity or modern facilities, affects the environment of the Earth. This statement may sound surprising for those billions of people, particularly in developing countries, who do not even know or ever think where such items come from and how products that they often use are manufactured. Most of us just use our toothbrushes or mobile phones or modern cars without imagining the many hours of effort and quantity of materials required for the production of such items. We are born in the modern age, and therefore most of us have no idea how different human life was 200 years ago when items were used to be made by hands and took several days. We should be thankful for those human endeavors that transformed the era of man-made into the era of man-and-machine-made.

The industrial revolutions that on one hand significantly facilitated our modern life but on the other hand brought several environmental problems. Notably, the second industrial revolution not only accelerated the development of new products and processes but also drastically increased the use of natural resources (Young, Byrne, & Cotterell, 1997). At that time, we were not aware nor thinking about the potential environmental impacts of the usage of coal or other fossil fuels in industrial plants and machinery. We were only focused on gaining economic benefits as much and as fast as possible (Folk, 2018). Unfortunately, we continued the same approach even after the third industrial revolution. Although a bit lately but we have now completely realized the environmental impacts of industrialization such as air and water pollution, soil contamination, habitat destruction, and climate change (Folk, 2018).

It is worth mentioning that some issues of industrialization such as toxicity due to dichlorodiphenyltrichloroethane (DDT), mercury pollution, and the Seveso disaster were treated case by case as an end-of-pipe approach. However, the current environmental issues such as the depletion of resources and climate change are global challenges that require a systematic and pro-active approach (De Meester, 2013). To work together with all countries on these global challenges, the United Nations (UN) established the World Commission on Environment and Development (WCED) commonly referred to as the Brundtland Commission. In 1987, they proposed the concept of sustainable development (see section 1.2.1). However, many countries remained unable to promote that concept and our natural resources are still not being used wisely and sustainably. Against this background, the UN adopted 17 Sustainable

Development Goals (SDGs). In 2015, the UN set specific targets for each SDG to be achieved over the next 15 years.

The concept of a circular economy (CE) is considered very relevant for sustainable development (see section 1.2.1). Indeed, CE practices can potentially contribute to the attainment of several targets of SDGs (Schroeder, Anggraeni, & Weber, 2019). For example, to attain SDG 12, a complete overhaul of our linear patterns (take-make-dispose) of production and consumption is necessary. Climate and finite natural resources of the Earth are two vital assets that are threatened by our current patterns (take-make-dispose) of production and consumption. A CE is therefore a necessity to sustain and improve human life and well-being (Deloitte Sustainability, 2016). The transition from a linear economy to CE requires joint efforts by stakeholders from all sectors. Organizations (businesses) have to play a major role in driving this transition. Organizations (particularly manufacturing businesses) may contribute to CE by developing competencies in circular design and recycling and by introducing innovative CE business models.

Organizations have been noticing increasing risks to their business associated with the linear economy. These risks include, but not limited to, decreasing supply of raw materials, high volatility of commodity prices, and pressure from regulatory bodies to meet recycling targets. Put differently, organizations are now increasingly recognizing that CE is indeed vital for the viability and sustainability of their business. Therefore, many organizations are keen to adopt CE. The problem is that though the ideas underpinning the concept of CE seem very simple, convincing, and a straightforward strategy (Haas, Krausmann, Wiedenhofer, & Heinz, 2015). However, organizations are not easily able to translate the concept of CE into their corporate strategies, business models, and operations due to many technical and non-technical barriers (Geng & Doberstein, 2008; Ormazabal, Prieto-Sandoval, Puga-Leal, & Jaca, 2018).

The present dissertation aims to contribute some knowledge regarding the above-mentioned problem. Overall, the present dissertation, using the Theory of Dynamic Capabilities (DCV) and the Theory of Planned Behavior (TPB), discusses the following aspects:

How important is CE?

How organizations may attain CE?

How beneficial is CE from a business perspective?

Before pointing out research gaps and specific objectives of the present dissertation, it is worthy to explain some concepts and theories in the next section.

1.2. Key Concepts and Theories

1.2.1. Sustainable Development and Circular Economy

The concept of sustainable development means a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). However, our current economic system is not optimized. There are several challenges that we need to tackle if we want to attain sustainable production and consumption patterns in line with our planetary limits (Jackson, 2009; Rockström et al., 2009). In this context, CE has attracted increased interest in recent years. The concept of CE, though not new rather itself a refurbished concept (Reike, Vermeulen, & Witjes, 2018), is still ill-defined but it borrows the characteristics from various sustainability management strategies such as eco-efficiency, servitization, cradle-to-cradle, biomimicry, and so on (Homrich, Galvão, Abadia, & Carvalho, 2018).

Lieder and Rashid (2016) point out that there are various possibilities for defining CE. There is still no clear or standard definition of CE (see Table 1.1). Nevertheless, CE can be understood as *“an economy that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times”* (Ellen MacArthur Foundation, 2015, p. 2). CE is conceived as a continuous positive development cycle that seeks to preserve and enhance natural capital, optimize resource yields, and minimize system risks by managing finite stocks and renewable flows. Ultimately, CE seeks to decouple global economic growth from finite resource consumption (Ellen MacArthur Foundation, 2015). Put differently, CE aims to demonstrate new concepts of system, economy, value, production, and consumption leading to the sustainable development of the economy, environment, and society (J. Wu, 2005).

As CE is closely linked with sustainable development, Prieto-Sandoval, Jaca, and Ormazabal (2018) defined CE as *“an economic system that represents a change of paradigm in the way that human society is interrelated with nature and aims to prevent the depletion of*

resources, close energy and materials loops, and facilitate sustainable development through its implementation at the micro (enterprises and consumers), meso (economic agents integrated in symbiosis) and macro (city, regions and governments) levels” (p. 610). It is estimated that organizations (businesses) in the EU can save €600 billion - equivalent to 8% of annual turnover - while also reducing total annual greenhouse gas emissions by 2-4% through CE measures (European Parliament, 2018a). Overall, CE has a huge potential to reduce pressure on the environment, boost economic growth, and create jobs. It is estimated that CE can create 580,000 jobs in the EU alone (European Parliament, 2018a).

The transition towards a CE needs a systematic approach. Yuan, Bi, and Moriguichi (2008) point out that interventions at the micro (organization-level), meso (industry-level), and macro levels (societal-level) are simultaneously necessary to scale up the shift towards CE. At the macro-level (EU, national, regional levels), several initiatives have been already introduced to facilitate the transition. For instance, the Circular Economy Package (at the EU-level), Circular Economy Promotion Law (at the national level - China), and SITRA Fund (at the national level - Finland). These interventions aim to make policies, provide funding, set targets, and establish monitoring frameworks. Similarly, at the meso-level, specific initiatives have been launched relevant to industries such as plastics, textiles, and furniture among others. However, at the micro-level, most organizations are still unclear about how they can proceed in this transition.

The adoption of CE, especially at the micro-level, is still very low around the world (Ghisellini, Cialani, & Ulgiati, 2016). Kumar, Sezersan, Garza-Reyes, Gonzalez, and AL-Shboul (2019) point out that to implement CE, the efforts should be made first of all at the micro-level. Then, the macro-level should be focused because each level forms a basis for the next level, and thereby it would be possible to develop sustainable economic growth and development. However, the tools and methodologies mentioned in the grey literature are too generic and insufficient for an organization to adopt CE. The existing literature on CE regarding the practical guidance and management know-how is still in its infancy. In particular, the CE literature still lacks on how organizations can implement CE. The academic discussion on CE is still missing frameworks explaining how organizations, that are willing to pursue CE, may adapt their existing business model or create new ones (Urbinati, Chiaroni, & Chiesa, 2017).

Table 1.1: Main Definitions of Circular Economy (CE)

Contributor	Definition
Yang and Feng (2008, p. 814)	<i>“Circular economy is an abbreviation of “Closed Materials Cycle Economy or Resources Circulated Economy” ... The fundamental goal of circular economy is to avoid and reduce wastes from sources of an economic process, so reusing and recycling are based on reducing”</i>
Geng and Doberstein (2008, p. 232)	<i>“[CE] mean the realization of a closed loop of materials flow in the whole economic system”</i>
Park, Sarkis, and Wu (2010, p. 1496)	<i>“The CE policy seeks to integrate economic growth with environmental sustainability, with one element relying on new practices and technological developments, similar to the application of environmental modernization technology”</i>
Ellen MacArthur Foundation (2013, p. 7)	<i>“A circular economy is an industrial system that is restorative or regenerative by intention and design. It replaces the ‘end-of-life’ concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models”</i>
Haas et al. (2015, p. 765)	<i>“The circular economy (CE) is a simple, but convincing, strategy, which aims at reducing both input of virgin materials and output of wastes by closing economic and ecological loops of resource flows”</i>
Stahel (2016, p. 435)	<i>“A ‘circular economy’ would turn goods that are at the end of their service life into resources for others, closing loops in industrial ecosystems and minimizing waste. It would change economic logic because it replaces production with sufficiency: reuse what you can, recycle what cannot be reused, repair what is broken, remanufacture what cannot be repaired”</i>
Sauvé, Bernard, and Sloan (2016, p. 53)	<i>“CE aims to decouple prosperity from resource consumption, i.e., how can we consume goods and services and yet not depend on extraction of virgin resources and thus ensure closed loops that will prevent the eventual disposal of consumed goods in landfill sites”</i>
Kirchherr, Reike, and Hekkert (2017, p. 224)	<i>“An economic system that is based on business models which replace the ‘end-of-life’ concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, thus operating at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations”</i>
Geissdoerfer, Savaget, Bocken, and Hultink (2017, p. 766)	<i>“A regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling”</i>

1.2.2. Theory of Dynamic Capabilities and Resource-Based View

Why do some organizations succeed in a dynamic (or a competitive) environment while other organizations usually fail in such an environment? The analysis of the history of well-established or reputable organizations shows that some of them (e.g. IBM and Apple) were able to adapt to changes in their environment and even to proactively stimulate change and prosper, while other organizations (e.g. Kodak) were not able to change and therefore failed (Konlechner, Müller, & Güttel, 2018).

A fundamental question of strategic management is how organizations can generate and sustain a competitive advantage. The resource-based view (RBV), one of the influential theories in management studies, argues that resources, which are simultaneously valuable, rare, inimitable, and non-substitutable (VRIN), are a source of competitive advantage (Barney, 1991). RBV assumes that resources are heterogeneous across organizations and this heterogeneity can sustain over time. It is worth noting that RBV presents a static view and thus can only explain how organizations can earn super-profits in a stable environment (Ambrosini & Bowman, 2009). RBV is criticized because it does not address how valuable resources can be created in the future nor explain how VRIN resources can be refreshed in dynamic environments. Put differently, RBV does not consider the influence of external factors such as the market (Eisenhardt & Martin, 2000).

As a response to compensate shortcomings of RBV, Teece and Pisano (1994) introduced the concept of dynamic capabilities. They argued that organizations can accomplish competitive advantage in a dynamic environment through their dynamic capabilities. It is worth mentioning that scholars unequivocally differentiate between dynamic capabilities and ordinary capabilities that simply enable an organization to perform day-to-day operations (Winter, 2003). The research on dynamic capabilities stands among the most prolific and active research streams within management studies for the last two decades. Scholars are still searching for the nature of dynamic capabilities, its antecedents or drivers, its outcomes, and its underlying processes (Albort-Morant, Leal-Rodríguez, Fernández-Rodríguez, & Ariza-Montes, 2018).

Teece, Pisano, and Shuen (1997) and Eisenhardt and Martin (2000) profoundly defined dynamic capabilities in their respective seminal works, and since then many scholars have

attempted to redefine and expand the concept of dynamic capabilities (Helfat et al., 2007; Winter, 2003; Zahra, Sapienza, & Davidsson, 2006; Zollo & Winter, 2002) (see Table 1.2). Although yet there is no conclusive definition, scholars generally agree that dynamic capabilities are an aggregation of organizational routines (Winter, 2003) through which organizations attain new resource configurations (Eisenhardt & Martin, 2000). Furthermore, dynamic capabilities are undergirded by “*microfoundations*”, that is, “*distinct skills, processes, and organizational activities*” (Teece, 2007). The underlying assumption of the Theory of Dynamic Capabilities (DCV) is that organizations, which can sense and then seize new opportunities and further reconfigure their resources and capabilities in line with recognized opportunities and changes in the environment, can create as well as sustain a competitive advantage (Breznik & Lahovnik, 2016; Teece, 2009, 2012).

Dynamic capabilities can be referred to as sensing, seizing, and reconfiguring capabilities (Teece, 2007). The sensing capabilities refer to a set of activities that primarily focus on scanning, learning, and interpretation. Teece (2007) highlights that sensing activities of organizations usually involve the understanding of customer needs and latent demands, analyzing market development, and observing their suppliers’ feedback and competitors’ actions. Teece (2007) suggests that organizations (especially manufacturing organizations) should continuously explore new (or developing) technologies in both local and foreign markets. In short, the main objective of sensing is to identify and shape emerging opportunities by providing market intelligence (Kindström, Kowalkowski, & Sandberg, 2013). Sensing capabilities enable an organization to focus on where it will stand tomorrow rather than where it stands today (Helfat et al., 2007).

The seizing capabilities refer to a set of activities that primarily focus on the implementation of that opportunity which has been already identified and assessed by an organization as conducive to competitive advantage. Seizing can also be referred to as a process, that is, mobilizing internal and external resources and/or competencies, to pursue an identified opportunity and to capture its value. Teece (2007) points out that the managerial skills required for both sensing and seizing are quite different. Put differently, an organization might have succeeded in identifying an opportunity, yet it may fail to seize that opportunity. To seize opportunities effectively, Teece (2007) suggests that organizations should have the ability to make good investment decisions, select or create appropriate business models, improve technological competences, and to maintain their assets.

The reconfiguring capabilities refer to the ability of an organization to recombine and reconfigure its resource base to accomplish an identified opportunity (Teece et al., 1997). Eisenhardt and Martin (2000) emphasize that the value of dynamic capabilities for competitive advantage lies in the ability of an organization to alter the resource base (create, integrate, recombine, and release resources). The reconfiguring capabilities are mainly underpinned in the routines of an organization. That is, these routines are responsible for the renewal and orchestration of resources and competencies (Teece, 2007). Reconfiguring is an iterative process that depends on an organization's internal and external environment. It is worth mentioning that minor adjustments in the resource base could be sufficient to exploit present opportunities. However, an organization would need a more extensive renewal of resources whenever the external (or business) environment changes (Helfat et al., 2007).

In short, dynamic capabilities may help organizations in generating new knowledge, products, and processes that can provide competitive advantages (Helfat et al., 2007). Even though corporate sustainability demands internalizing environmental and social concerns into business models which increase dynamism and add complexity (Arend, 2014), dynamic capabilities are highly valuable in dealing with such complexities (Eikelenboom & de Jong, 2019). Indeed, scholars have a broad consensus on the significance of dynamic capabilities for corporate sustainability (Amui, Jabbour, de Sousa Jabbour, & Kannan, 2017).

Table 1.2: Main Definitions of Dynamic Capabilities (DCs)

Contributor	Definition
Teece and Pisano (1994, p. 541)	<i>“The subset of the competences/capabilities which allow the firm to create new products and processes, and respond to changing market circumstances”</i>
Teece et al. (1997, p. 516)	<i>“The firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments”</i>
Eisenhardt and Martin (2000, p. 1107)	<i>“The firm’s processes that use resources—specifically the processes to integrate, reconfigure, gain, and release resources—to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve and die”</i>
Teece (2000, p. 35)	<i>“The ability to sense and then seize opportunities quickly and proficiently”</i>
Griffith and Harvey (2001, p. 598)	<i>“The creation of difficult-to-imitate combinations of resources, including effective coordination of inter-organizational relationships, on a global basis that can provide a firm a competitive advantage”</i>
Zollo and Winter (2002, p. 340)	<i>“A learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness”</i>
Adner and Helfat (2003, p. 1012)	<i>“The capabilities with which managers build, integrate, and reconfigure organizational resources and competences”</i>
Winter (2003, p. 991)	<i>“Those [capabilities] that operate to extend, modify or create ordinary capabilities”</i>
Zahra et al. (2006, p. 918)	<i>“The abilities to reconfigure a firm’s resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker(s)”</i>
Teece (2007, p. 1319)	<i>“The capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise’s intangible and tangible assets”</i>
Helfat et al. (2007, p. 4)	<i>“The capacity of an organization to purposefully create, extend, or modify its resource base”</i>
Pavlou and El Sawy (2011, p. 239)	<i>“A means for addressing turbulent environments by helping managers extend, modify, and reconfigure existing operational capabilities into new ones that better match the environment”</i>
Helfat and Martin (2015, p. 1281)	<i>“The capabilities with which managers create, extend, and modify the ways in which firms make a living—helps to explain the relationship between the quality of managerial decisions, strategic change, and organizational performance”</i>

1.2.3. Theory of Planned Behavior and Reasoned Action

Fishbein and Ajzen (1975) proposed the Theory of Reasoned Action (TRA) based on various theories of attitude such as learning theory, expectancy-value theory, and consistency theories (Sheppard, Hartwick, & Warshaw, 1988). According to TRA, if an individual evaluates the suggested behavior as positive, and if he/she thinks that other individuals expect from him/her to perform that behavior, this results in a higher intention and thus that individual is more likely to do so. Fishbein and Ajzen (1975) assumed that human behavior can be controlled by human will to take an action. However, TRA was criticized that human behavior could not be fully explained without considering various factors that affect human intentions.

As a response to overcome this shortcoming of TRA, Ajzen (1985) proposed the Theory of Planned Behavior (TPB) by including another variable into the TRA model, that is, perceived behavioral control (Ajzen, 1991). TPB postulates that attitude towards behavioral intention, subjective norms, and perceived behavioral control together shape behavioral intention as well as actual behavior (Ajzen, 1985). Put differently, behavioral intention towards the actual behavior is collectively influenced by the attitude, subjective norms, and perceived behavioral control (see Figure 1.1). These variables are measured through their respective beliefs that are usually designed (or taken) as per the context of the study.

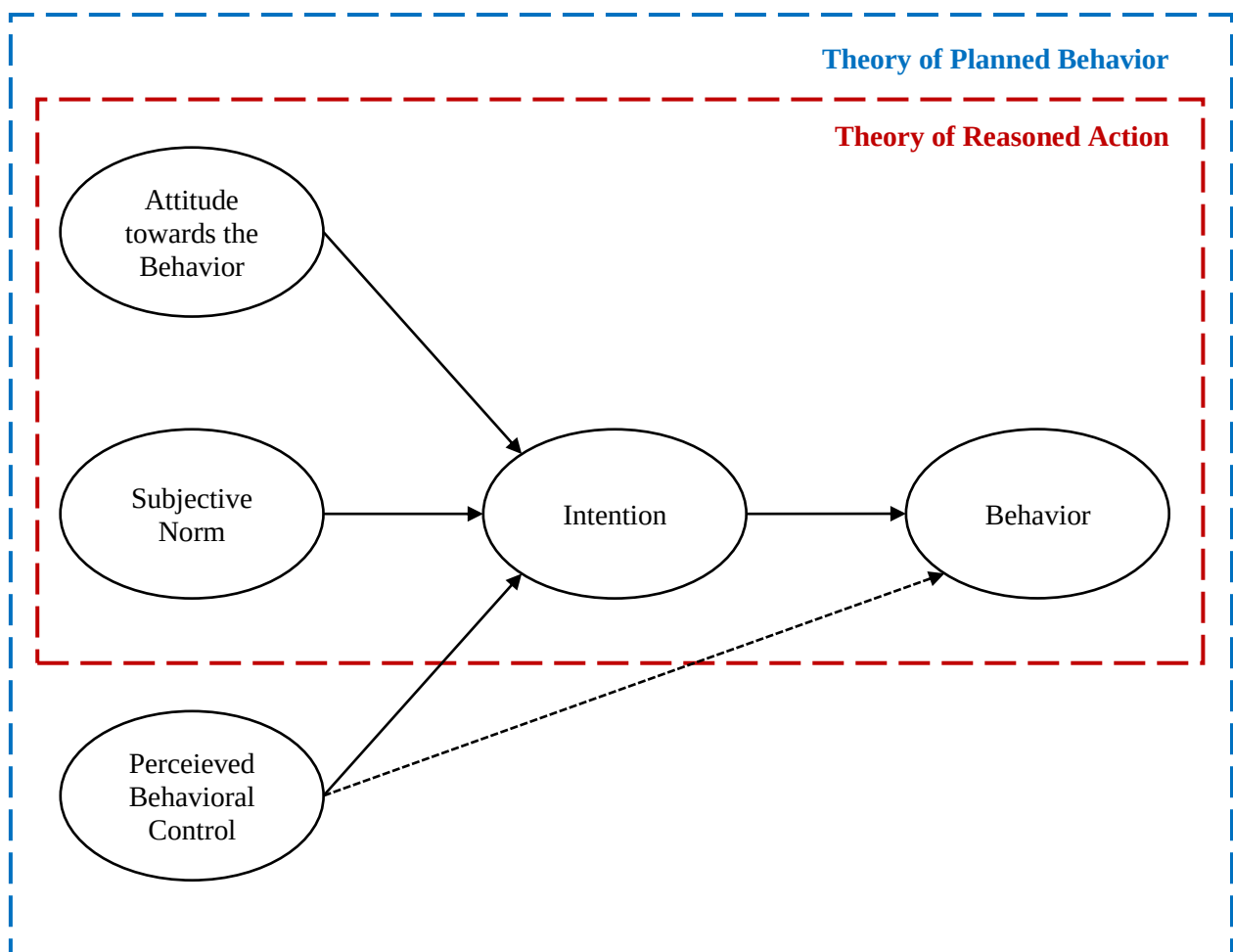
Ajzen (1991) defines attitude as *“the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question”* (p. 188). A positive or negative attitude of an individual towards a certain behavior respectively strengthens or weakens his/her intention to perform that certain behavior in question.

Next to attitude, Ajzen (1991) defines subjective norms as *“the perceived social pressure to perform or not to perform the behavior”* (p. 188). The behavioral intention of an individual is usually influenced by the expectations of a group or society to which he/she belongs. Fishbein and Ajzen (2011) explicate norms as injunctive norms (*perceptions of what others consider to be correct behavior*) and descriptive norms (*perceptions of what others are actually doing*). It is worth noting that subjective norms vary in different contexts such as countries. A norm in a developed country may not necessarily be a norm in a developing country and vice versa.

Next to subjective norms, Ajzen (1991) defines perceived behavioral control as “*the perceived ease or difficulty of performing the behavior*” (p. 188). The behavioral intention of an individual is dependent on his/her perceived ability or power to perform that certain behavior in question.

TPB has become one of the most influential theories used to understand human behavior. The TPB model is still regarded as the most effective model for designing behavioral interventions despite some criticism and several competing behavioral models (Yuriev, Dahmen, Paillé, Boiral, & Guillaumie, 2020). The TPB model has been increasingly employed, to predict and explain a wide range of behaviors, across various disciplines including, but not limited to, psychology, marketing, healthcare, environmental science, and sustainability management (Daddi, Todaro, De Giacomo, & Frey, 2018; Si et al., 2019).

Figure 1.1: Models of TRA and TPB



1.3. Research Gaps and Objectives

CE is regarded as a vital tool to operationalize sustainable development (Kirchherr et al., 2017). However, the linear economy (take-make-dispose) is still prevalent, and even persistent in many countries, though it is unable to meet sustainability challenges of the world that simultaneously requires sustained economic growth, environmental protection, and societal wellbeing (Jawahir & Bradley, 2016). It is worth noting that humans have been consuming 70% more natural resources each year than the regenerative capacity of the world thus causing several environmental problems. If this consumption pace continues in a linear economy approach (take-make-dispose), humans will need 200% more natural resources by 2050 due to the increase in global ecological footprint (Global Footprint Network, 2018).

In this scenario, many organizations will not be able to survive in the market. For instance, organizations from the manufacturing sector whose production heavily depends on scarce materials will have to temporarily shut down their production due to the unavailability of resources or supply disruptions. These organizations will not be able to forecast their business and to compete with other organizations that are less dependent on scarce materials. Furthermore, these organizations will be at high risk of losing their brand value and customer loyalty due to their bad ecological footprint (Accenture, 2014). To avoid such a scenario, sooner or later, organizations, particularly those that belong to the manufacturing sector, will have no choice except CE implementation.

CE is undoubtedly a key strategy for organizations to achieve corporate sustainability (Murray, Skene, & Haynes, 2017). Many scholars and practitioners argue that CE is a viable and scalable growth model that can radically improve resource productivity and reverse current trends to overcome the sustainability challenges of the world (Accenture, 2014; Ellen MacArthur Foundation, 2013; Ghisellini et al., 2016; Homrich et al., 2018; Merli, Preziosi, & Acampora, 2018). It is worth mentioning that theoretically speaking the ideas underpinning the concept of CE seem very simple, convincing, and a straightforward strategy (Haas et al., 2015). However, in practice, organizations are not easily able to translate the concept of CE into their corporate strategies, business models, and operations due to many technical and non-technical barriers (Geng & Doberstein, 2008; Ormazabal, Prieto-Sandoval, Jaca, & Santos, 2016; Ormazabal et al., 2018; Ritzén & Sandström, 2017; Rigos et al., 2016). Moreover, some reports point out that organizations are simply not built to capitalize on CE opportunities because their

strategies, structures, operations, and supply chain are deeply rooted in a linear economy approach to growth (Accenture, 2014).

To cope with emerging sustainability challenges, scholars suggest that organizations should reconfigure their existing resources and capabilities (Hart, 1995; Q. Wu, He, & Duan, 2013). Lacy and Rutqvist (2015) suggest that organizations need to develop new capabilities to reorganize their strategies, structures, and business models that are free from the constraints of linear economy thinking. However, in the context of CE, how organizations can develop such capabilities and gain a competitive advantage is not yet well-explored. Although the number of studies focused on CE is sharply increasing, the existing literature on CE is highly granular and rarely touching the implementation level (Lieder & Rashid, 2016). To the best of our knowledge, there is almost no or very little academic discussion on how organizations can adopt CE.

To explore the evolution of organizational capabilities, the Theory of Dynamic Capabilities (DCV) is one of the most prominent theories in management studies. This theory has been widely used in strategic management studies (Eisenhardt & Martin, 2000; Winter, 2003; Zahra et al., 2006). Also, it has been increasingly used in corporate sustainability studies (Chakrabarty & Wang, 2012; Hofmann, Theyel, & Wood, 2012; Kabongo & Boiral, 2017; Q. Wu et al., 2013; Zhu, Cordeiro, & Sarkis, 2013). Q. Wu, He, Duan, and O'Regan (2012, p. 233) observed that *“how firms develop and apply dynamic capabilities to address the distinctive challenges involved in corporate change toward sustainability is yet to be fully explored”*. Other scholars noted this theory is still underused, particularly in environmental management studies (Daddi et al., 2018), and therefore more research is essentially needed on dynamic capabilities for corporate sustainability (Amui et al., 2017). There is still no or very little academic discussion on how organizations can develop new or (dynamic) capabilities for CE. Notably, there is a paucity of research on specific skills, processes, and organizational activities (microfoundations of dynamic capabilities) that might facilitate CE implementation.

In light of the above discussion, the first objective of the present dissertation is to explore dynamic capabilities for CE. In other words, the first objective is to identify and develop a framework of specific skills, processes, and organizational activities (microfoundations of dynamic capabilities) that might facilitate CE implementation.

Scholars perceive that CE can provide a sustainable competitive advantage to organizations. However, the transition towards CE is not so simple rather a complex process that demands an organizational change (Ritzén & Sandström, 2017). Mousavi, Bossink, and van Vliet (2018) point out that the ability and willingness of an organization to implement an organizational change is dependent on its dynamic capabilities. Scholars have just recently begun to use DCV in the CE context (Kabongo & Boiral, 2017; O. Khan, Daddi, & Iraldo, 2020; Scarpellini, Marín-Vinuesa, Aranda-Usón, & Portillo-Tarragona, 2020; Scarpellini, Valero-Gil, Moneva, & Andreaus, 2020). Kabongo and Boiral (2017) and O. Khan et al. (2020) show that dynamic capabilities facilitate CE implementation. However, the findings of these two case studies may not be generalized. Hence, the role of dynamic capabilities for CE implementation needs to be further explored and thoroughly tested. It is worth mentioning that academic discussion on dynamic capabilities is mainly conceptual (Eriksson, 2013). Indeed, the majority of key studies on dynamic capabilities are qualitative studies while quantitative studies are based on secondary data (Ambrosini & Bowman, 2009). Therefore, more quantitative studies and mixed-method studies are needed (Eriksson, 2013; Wang & Ahmed, 2007). However, a key issue for quantitative studies is that the existing literature still lacks generally accepted approaches (or scales) to measure dynamic capabilities (Mousavi et al., 2018; Zhou, Zhou, Feng, & Jiang, 2019).

In light of the above discussion, the second objective of the present dissertation is first to develop scales to measure dynamic capabilities, then to empirically investigate whether dynamic capabilities (sensing, seizing, and reconfiguring) facilitate CE implementation, and finally to highlight which are the most important dynamic capabilities and organizational routines for CE implementation.

Scholars argue that dynamic capabilities involve substantial costs (Winter, 2003) thus organizations would be hesitant to use dynamic capabilities without having any compelling reason or knowing potential benefits (Wilden, Gudergan, Nielsen, & Lings, 2013). In other words, it could be assumed that organizations might not be interested in developing dynamic capabilities for CE objectives unless they are sure that this would consequently improve their overall performance (Gusmerotti, Testa, Corsini, Pretner, & Iraldo, 2019). However, to the best of our knowledge, the relationship between CE implementation and the overall performance of organizations is not yet thoroughly tested. Moreover, the existing literature on CE does not explain what scenario (or factors) might push organizations towards CE implementation.

In light of the above discussion, the third objective of the present dissertation is to empirically test whether CE is beneficial for organizations from a business perspective. More precisely, the third objective is to empirically test whether and to what extent the confluence of dynamic capabilities and CE implementation improves the overall performance of organizations, and whether a circular dynamic environment influences the transition towards a CE.

To implement a CE, industry-specific policies, targets, and strategies have been introduced (see section 1.2.1), but the most popular among others is CE for plastics. A CE for plastics implies that the value of plastics in the economy should be maintained without leakage into the natural environment (Ellen MacArthur Foundation, 2017). In the EU, the potential to recycle plastic waste is still largely unexploited (European Parliament, 2018b). Therefore, the European Commission announced “*a European Strategy for Plastics in a Circular Economy*” (European Commission, 2018), and the EU set new recycling targets for plastics at a minimum of 50% by 2025 and 55% by 2030 (EU, 2018). It is worth noting that some technical approaches and alternative materials have been proposed to support CE for plastics. However, technical approaches alone are insufficient since psychological and behavioral traits often undermine the viability of technical solutions (Heidbreder, Bablok, Drews, & Menzel, 2019). Put differently, both technical solutions and pro-environmental human behavior are essential to attain CE for plastics.

A plethora of previous studies had employed TPB to predict human intention and behavior to waste recycling (Botetzagias, Dima, & Malesios, 2015; F. Khan, Ahmed, & Najmi, 2019; Taylor & Todd, 1995; Tonglet, Phillips, & Read, 2004). However, previous studies mainly considered a sample from households (e.g. heads of the family or housewives) or academic institutions (e.g. adult students) to predict individual-level outcomes (Geiger, Steg, van der Werff, & Ünal, 2019). Somewhat surprisingly, previous studies rarely considered a sample from organizations (e.g. managers or employees) to predict organizational-level outcomes. It is worth mentioning that previous studies overlooked organizations as a context not only in the case of waste recycling but also in the case of other pro-environmental behaviors (Yuriev et al., 2020). A few studies have employed TPB to predict managers’ intentions and behaviors to other environmental concerns (Cordano & Frieze, 2000; Flannery & May, 2000). However, to the best of our knowledge, corporate decision makers’ intentions and behaviors

(which can be referred to as organizations' intentions and behaviors) to waste recycling, particularly plastics recycling, remains still unexplored.

In light of the above discussion, the final objective of the present dissertation is to explore current behavioral practices of organizations towards a CE for plastics. More precisely, the objective is first to empirically assess the determinants of intentions and behaviors of organizations to implement best practices of plastic recycling, and then to suggest how the intention-behavior gap may be overcome to attain a CE for plastics.

1.4. Research Questions and Approach

The research question in line with the first objective (see section 1.3) of the present dissertation is:

How organizations can identify and pursue CE opportunities?

To answer the above question, using a qualitative research approach, we investigated how organizations (that have successfully implemented CE) identified and addressed CE business opportunities (see Table 1.3). In other words, we analyzed what dynamic capabilities these organizations possess (that facilitated them in CE implementation) so a general framework can be proposed for other organizations (that are willing to adopt CE).

The research question (besides the underlying hypotheses) in line with the second objective (see section 1.3) of the present dissertation is:

Which are the key capabilities and organizational routines for CE?

To answer the above question (besides testing the proposed hypotheses), using a quantitative research approach, we empirically tested the presented framework (i.e. identified microfoundations dynamic capabilities) with a large sample of organizations from the manufacturing sector (see Table 1.3). Accordingly, using the Importance-Performance Matrix Analysis (IPMA), we highlighted key capabilities and organizational routines for CE.

The research question (that represents the proposed hypotheses) in line with the third objective (see section 1.3) of the present dissertation is:

Do dynamic capabilities and CE implementation improve the overall performance of organizations? And do the circular dynamic environment influence CE implementation?

To answer the above questions, using a quantitative research approach, we empirically tested the proposed hypotheses with a large sample of organizations from the manufacturing sector (see Table 1.3). In other words, we analyzed which aspects of an organization in terms of performance are usually improved (or can be expected to improve) through the confluence of dynamic capabilities and CE implementation.

The research questions in line with the final objective (see section 1.3) of the present dissertation is:

What factors cause the intention-behavior gap? and how organizations can attain a CE for plastics?

To answer the above questions, using a quantitative research approach, we empirically tested the proposed hypotheses with a large sample of organizations from various sectors (see Table 1.3). Furthermore, we highlight which best practices of plastic recycling are being implemented, and which barriers most organizations have been facing in the transition towards CE for plastics.

Table 1.3: Outline of Research Approach

Chapter	Title	Description	Methodology	Sample	Data Collection	Type of Analysis
2	Dynamic Capabilities of Organizations for Circular Economy: A Multiple-Case Study	Exploration of Dynamic Capabilities in the context of Circular Economy	Qualitative	4 Organizations (Successful Cases)	Interviews Sustainability Reports Media Interviews / Press Releases Official Websites	Content Analysis (NVivo 12)
3	Key Dynamic Capabilities and Routines of Organizations for Circular Economy Implementation: Evidence from the Manufacturing Sector	Empirical Testing of Dynamic Capabilities (<i>identified in chapter 2</i>) that might facilitate Circular Economy	Quantitative	220 Organizations (Manufacturing Sector)	Online Survey	Statistical Analysis (SmartPLS 3)
4	The Role of Circular Dynamic Environment and Dynamic Capabilities in Circular Economy Implementation and Performance of Organizations: Evidence from the Manufacturing Sector	Empirical Testing of whether or not Dynamic Capabilities and Circular Economy improves Overall Performance	Quantitative	220 Organizations (Manufacturing Sector)	Online Survey	Statistical Analysis (SmartPLS 3)
5	Behavioral Practices of Organizations towards a Circular Economy for Plastics: Evidence from Various Sectors	Empirical Testing of Factors that Cause Intention-Behavior Gap	Quantitative	637 Organizations (Various Sectors)	Online Survey	Statistical Analysis (SmartPLS 3)

1.5. Structure of the Dissertation

There are four types of dissertations: (i) traditional-simple, (ii) traditional-complex, (iii) topic-based, (iv) and compilation of research papers (Paltridge, 2002). The structure of the present dissertation is mainly the fourth type though some similarities with other types of dissertations can be observed. The present dissertation includes four research papers, each composed of own introduction, literature review, methodology, results, discussion, and conclusions. These research papers hereinafter referred to as chapter 2, chapter 3, chapter 4, and chapter 5. These chapters can be read independently as a complete entity. A Ph.D. by publications is preferred in many universities because in this way a candidate develops his/her skills in writing research papers for submission to peer-reviewed journals. Furthermore, a candidate gets constructive feedback from peers during the review process and even after the publication of his/her research papers. Consequently, he/she develops more research ideas during his/her Ph.D. Nonetheless, this type of dissertation (compilation of research papers) should be coherent and logical as a whole.

The present dissertation is comprised of six chapters:

Chapter 1 explains the background and scope of the present dissertation. The core of the present dissertation is indeed based on the research papers submitted and/or published in international peer-reviewed journals. Therefore, this chapter not only explains the theoretical framework of research papers presented herein but also justifies the logical connection of those research papers. This chapter first highlights a general background, explains key concepts and theories, and finally points out the research gaps and objectives of the present dissertation.

Chapter 2 highlights an important research gap and advances the work accordingly. This chapter explains the dynamic capabilities of four specific organizations in the context of CE. In line with the research objectives of the present dissertation, it explores how did four organizations (successful cases of CE) identify and pursue CE opportunities. In other words, what dynamic capabilities those specific organizations possess that facilitated them in CE implementation.

Chapter 3 advances the work of the previous chapter with a bit different research approach. This chapter explains which are the most important dynamic capabilities and

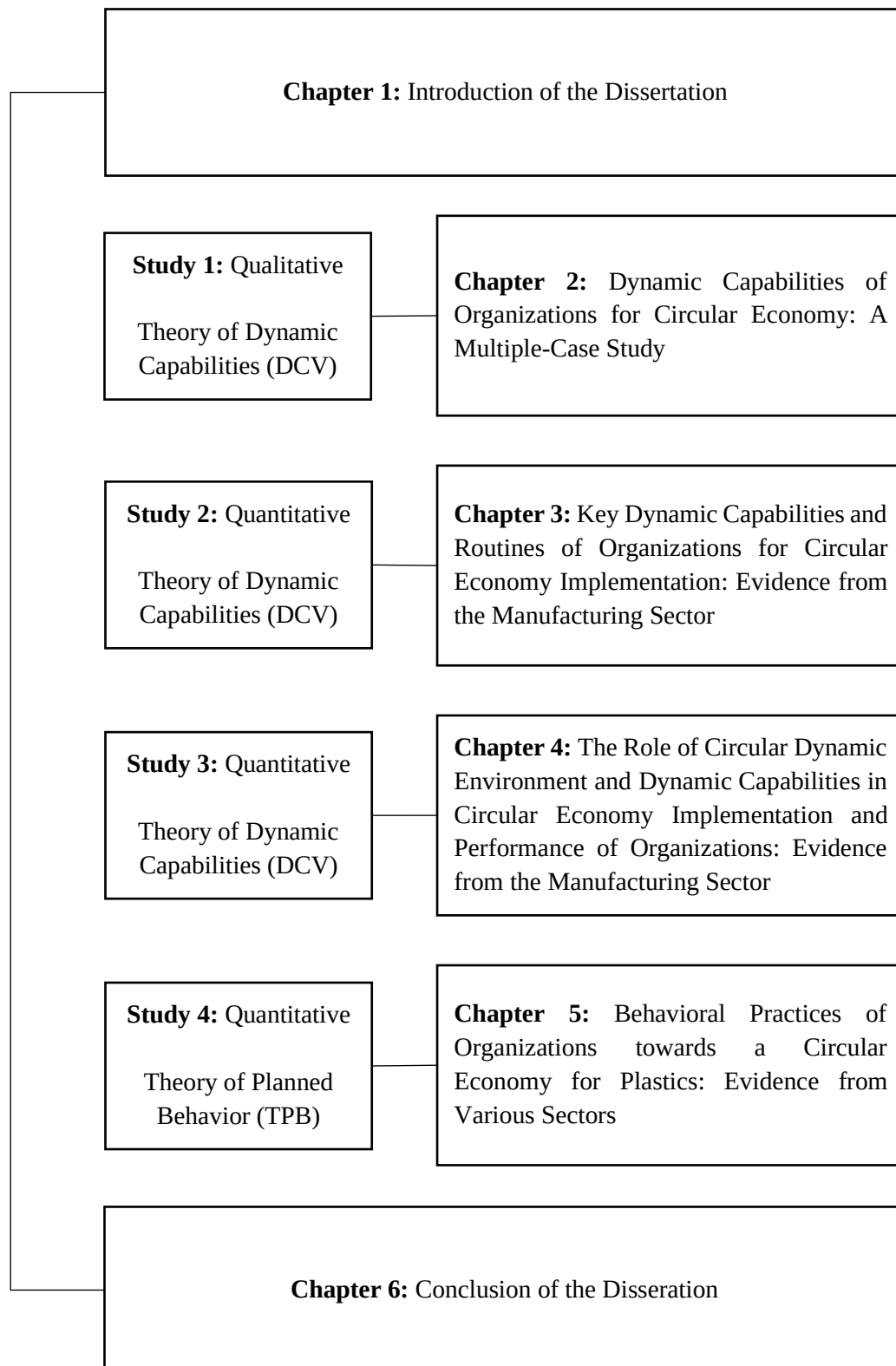
organizational routines that organizations should develop and apply for CE implementation. It empirically tests those identified dynamic capabilities (of four successful cases of CE) in the manufacturing sector.

Chapter 4 advances the work of the previous chapter to the next level. Chapter 4 further analyzes the significance of dynamic capabilities from the perspective of businesses. It empirically investigates in the manufacturing sector whether or not a circular dynamic environment and dynamic capabilities can contribute to CE implementation and organizational performance.

Chapter 5 adopts a bit different approach, at least in terms of a theoretical framework herein used, compared to previous chapters. This chapter widens the research focus on all sectors, which was just limited to the manufacturing sector in previous chapters. This chapter explains the role of behavioral traits and practices of decision makers and organizations in the transition towards CE for plastics. It empirically investigates the factors that cause the intention-behavior gap in organizations.

Chapter 6 presents the conclusion of the present dissertation. It provides a general discussion regarding contributions as well as the limitations of the present dissertation. Lastly, it suggests some recommendations for future research.

Figure 1.2: Schematic Overview of the Dissertation



CHAPTER 2

Dynamic Capabilities of Organizations for Circular Economy: A Multiple-Case Study

Redrafted from:

Khan, O., Daddi, T., & Iraldo, F. (2020). **Microfoundations of dynamic capabilities: Insights from circular economy business cases.** *Business Strategy and the Environment*, 29(3), 1479–1493. <https://doi.org/10.1002/bse.2447>

2.1. Introduction

Circular economy (CE) is a key strategy to achieve corporate sustainability (Murray et al., 2017). Scholars and practitioners argue that CE is a viable and scalable growth model that can radically improve resource productivity and reverse current trends to overcome global sustainability challenges (Ellen MacArthur Foundation, 2013; Ghisellini et al., 2016; Merli et al., 2018). In theory, the ideas underpinning the concept of CE seem very simple and convincing and point to a straightforward strategy (Haas et al., 2015). However, in practice, organizations are not easily able to translate the concept of CE into their corporate strategies, business models, and operations due to many technical and non-technical barriers (Geng & Doberstein, 2008; Ormazabal et al., 2018).

Some reports point out that organizations are simply not built to capitalize on CE opportunities because their strategies, structures, operations, and supply chain are deeply rooted in a linear economy approach to growth (Accenture, 2014). To cope with emerging sustainability challenges, scholars suggest that organizations should reconfigure their existing resources and capabilities (Hart, 1995; Q. Wu et al., 2013). Similarly, Lacy and Rutqvist (2015) suggest that organizations need to develop new capabilities to reorganize their strategies, structures, and business models to those that are free from the constraints of linear economy thinking. However, in the context of CE, how organizations can develop such capabilities and gain a competitive advantage is not yet well-explored. Notably, there is a paucity of research on particular skills, processes, and organizational activities that may facilitate CE implementation.

To address this knowledge gap, we employ the theory of dynamic capabilities. In fact, this theory is an ideal approach since CE is a rapidly changing environment (Bag, Gupta, & Foropon, 2019). Moreover, this theory has been employed in strategic management studies (Eisenhardt & Martin, 2000; Winter, 2003; Zahra et al., 2006) as well as in the corporate sustainability studies (Kabongo & Boiral, 2017; Q. Wu et al., 2013). However, Daddi et al. (2018) noted that this theory is least explored in the context of environmental management studies. Also, Q. Wu et al. (2012) observed that *“how firms develop and apply dynamic capabilities to address the distinctive challenges involved in corporate change toward sustainability is yet to be fully explored”* (p. 233). Hence, in general, more research is needed on dynamic capabilities for corporate sustainability (Amui et al., 2017).

Drawing on the framework of Teece (2007), we aim to understand how organizations can practically identify and address CE business opportunities. Using a multiple-case studies approach, we explore particular skills, processes, and organizational activities that may facilitate CE implementation. We contribute to the literature by providing empirical evidence of microfoundations of dynamic capabilities for CE implementation. The rest of this paper is divided into five sections. Section 2.2 highlights the theory of dynamic capabilities, reviews the existing literature on corporate sustainability and CE, and accordingly formulates the research questions. Section 2.3 describes the research methodology and section 2.4 presents the main findings. Section 2.5 discusses the main findings as per the research questions in the light of existing literature. Finally, section 2.6 concludes the discussion, points out some implications and suggests future research avenues.

2.2. Literature Review

2.2.1. Theory of Dynamic Capabilities

Teece et al. (1997) disseminated the concept of dynamic capabilities as *“the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environment”* (p. 516). Teece (2007) further explicates that dynamic capabilities can be disaggregated in the capacity as *“(1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the firm’s intangible and tangible assets”* (p. 1319). In short, dynamic capabilities can be referred to as sensing, seizing, and reconfiguring capabilities, which are undergirded by microfoundations that are comprised of distinct skills, processes, and organizational activities (Teece, 2007).

Sensing capabilities refer to a set of activities that is comprised of scanning, learning, and interpretation. Sensing activities focus on understanding customer needs, latent demands, development of markets, and the responses from suppliers and competitors (Teece, 2007). In addition, Teece (2007) suggests that organizations should continuously search and explore different technologies in both local and international markets. Seizing capabilities refer to the activities that focus on the implementation of that opportunity which has been identified as conducive to competitive advantage. Seizing involves the mobilization of internal and external

resources and competencies. To seize opportunities effectively, Teece (2007) points out that organizations must have the ability to make good investment decisions, create the right business models, and improve technological competences and maintain assets. In addition, employees' motivation and strong relationships with suppliers and customers are also important (Teece, 2007).

Reconfiguring capabilities refer to the ability of an organization to recombine and reconfigure its resource base in order to address an identified opportunity conducive to competitive advantage. The reconfiguring capabilities are underpinned in an organization's routines that enable the renewal and orchestration of resources and competencies to match the requirements of a changing environment (Teece, 2007). Reconfiguring activities are iterative and minor adjustments may be adequate to exploit present opportunities. However, an organization may need to undertake more extensive reconfiguration whenever the business environment changes (Helfat et al., 2007). In short, dynamic capabilities can ensure organizations a sustained competitive advantage.

2.2.2. Dynamic Capabilities in Corporate Sustainability and Circular Economy (CE)

The research on dynamic capabilities stands among the most prolific and active research streams within management studies for the last two decades. In fact, scholars are still searching for the nature of dynamic capabilities, its antecedents or drivers, its outcomes, and its underlying processes (Albort-Morant et al., 2018). The literature shows that most of the previous studies on dynamic capabilities mainly focused on how organizations can meet their economic bottom line by gaining a competitive advantage in the market (Winter, 2003; Zahra et al., 2006). Nevertheless, scholars also employed dynamic capabilities in the corporate sustainability studies (Hofmann et al., 2012; Kabongo & Boiral, 2017; Q. Wu et al., 2013; Zhu et al., 2013). Scholars argue that dynamic capabilities have an important role in achieving corporate sustainability (Annunziata, Pucci, Frey, & Zanni, 2018; Strauss, Lepoutre, & Wood, 2017; Q. Wu et al., 2013). Therefore, more research should be conducted on this topic (Amui et al., 2017).

Hart (1995) points out that the transition towards corporate sustainability is not straightforward and organizations may encounter various unexpected challenges. Scholars believe that corporate sustainability, a pillar of the circular economy, fundamentally requires

an organizational change (Bansal, 2005; Ritzén & Sandström, 2017; Strauss et al., 2017). Wu et al. (2013) argue that whether or not an organization can overcome its sustainability challenge lies in the development and application of its dynamic capabilities. Annunziata et al. (2018) point out that organizations aiming to achieve corporate sustainability should identify and develop dynamic capabilities to implement those practices which are the source of competitive advantage. Strauss et al. (2017) suggest identifying the microfoundations of dynamic capabilities instead of identifying factors that usually contribute to corporate sustainability. Amui et al. (2017) concluded that the research on dynamic capabilities for corporate sustainability can guide organizations on how to develop such capabilities and adjust their strategies to cope with sustainability challenges.

Russo (2009) and Zhu et al. (2013) explored corporate environmental management through the perspective of dynamic capabilities. Russo (2009) argues that the development of environmental management skills is a prime example of the development of a dynamic capability since it requires the integration of various organizational resources. Similarly, Aragón-Correa and Sharma (2003) consider proactive environmental strategy as a dynamic capability since it depends on specific path-dependent processes that are embedded within organizations (Zhu et al., 2013). More recently, Kabongo and Boiral (2017) explored dynamic capabilities for eco-efficient activities inherent to industrial ecology. They found that dynamic capabilities for eco-efficient activities largely depend upon the integration and coordination of competencies, innovations, and new routines related to several functional areas of the organization. In short, technological developments, control of residual flows, adjustments in human resources (hiring and training), green management (including green marketing and interconnectedness within the organization), higher-order learning, and strategic growth are the key organizational capabilities that drive eco-efficiency (Kabongo & Boiral, 2017).

The concept of CE is viewed as a strategy to achieve corporate sustainability (Ghisellini et al., 2016; Murray et al., 2017). organizations have begun to integrate CE into their corporate sustainability agenda (Stewart & Niero, 2018). However, most organizations are still questioning how they can adjust their existing business models or create new business models for CE (Urbinati et al., 2017). In this regard, some scholars have contributed to the literature (Bocken, de Pauw, Bakker, & van der Grinten, 2016; Linder & Williander, 2017; Pieroni, McAloone, & Pigosso, 2019). Notably, Inigo, Albareda, and Ritala (2017) examined how organizations build and draw new organizational capabilities, routines, and processes to

identify, design, and develop business model innovation (BMI) for sustainability. Some scholars show that organizations are unable to adopt CE business models since they usually face many challenges and barriers such as financial, operational, organizational, attitudinal, and technological barriers (Geng & Doberstein, 2008; Ormazabal et al., 2018; Ritzén & Sandström, 2017).

To adopt CE business models, organizations will have to make disruptive changes and reconfigure their organizational capabilities. Inigo et al. (2017) indicate that radical transition towards sustainability requires out-of-the-box thinking and effective use of organizational and managerial capabilities. Eisenhardt and Martin (2000) suggest that organizations should allocate and utilize both their visible and invisible resources towards their specific objectives. However, what those processes and specific mechanisms through which organizations develop organizational capabilities for CE objectives are is still an open question. In this regard, Kabongo and Boiral (2017) explicate that such dynamic capabilities are developed and integrated through a four-stage process: local experimentation, internal operationalization, enlargement/cross-functional integration, and strategic consolidation. Nevertheless, there is a paucity of research on particular skills, processes, and organizational activities that may facilitate CE implementation.

To contribute to this theoretical framework, we aim to explore the role of dynamic capabilities in CE business cases' success by focusing on the role of three key capacities of the theory: sensing, seizing, and reconfiguring. According to Teece (2007), sensing is the capacity to sense new opportunities (for new products, processes, and services) in a rapidly changing environment such as the CE market. Teece (2007) highlights that this capacity can be linked to various activities (such as constant scanning, searching, and exploring across technologies and markets) and elements (such as consumer needs, technological opportunities, suppliers, and competitors' actions) of business management. Thus, our first research question is:

RQ1: What are the most important activities and elements to sense CE opportunities?

Seizing capacity refers to the specific actions aimed to develop a strategy, to redesign the business model, and to identify a governance structure in order to pursue newly sensed opportunities (Teece, 2007). Thus, our second research question is:

RQ2: What actions are usually taken by organizations to seize newly sensed CE opportunities?

Reconfiguring capacity allows organizations to reconfigure internal and external resources in order to address newly sensed opportunities (Teece et al., 1997). The reconfiguration could deal with several dimensions and resources of organizations such as human resources, technologies, assets structure, and operations for the development of new products or processes. Thus, our third research question is:

RQ3: What resources are usually reconfigured by organizations to address newly sensed CE opportunities?

2.3. Methodology

2.3.1. Cases Selection

To address our research questions, we adopted a multiple-case studies approach due to the following reasons. The literature shows that most of the research on dynamic capabilities is conceptual in nature. In contrast, empirical research on dynamic capabilities is either large-scale surveys or single-case studies (Albort-Morant et al., 2018). It is argued that dynamic capabilities are embedded in an organization's organizational routines and processes. Thus, they are difficult to identify through quantitative measures. Whereas, single-case studies pose some limitations. Therefore, a multiple-case studies approach is more suitable. Moreover, the multiple-case studies approach applies replication logic, and cases are chosen by theoretical means rather than statistical sampling (Yin, 2009).

There is no ideal number of cases to be chosen. However, 4 to 10 cases are considered ideal (Eisenhardt, 1989). As a purposive theoretical sampling, we consulted well-recognized sources that listed successful CE business cases of Italy (Economiacircolare, 2019; Legambiente, 2019; Symbola, 2019). We noticed that most of the CE businesses are start-ups or recently established organizations. However, we only considered those organizations who transitioned their business from a linear economy approach to the circular economy due to sustainability threats or the rapidly changing environment. In short, we carefully selected 4 successful CE business cases to explore the role of dynamic capabilities in their CE success. The chosen successful CE business cases, here anonymized as Alpha, Beta, Gamma, and Delta though collectively referred to as case firms, are shortly described in Table 2.1.

Table 2.1: Description of CE Business Cases

Case Firms	Employees	Core Business	CE Description
Alpha	~1350	It manufactures paper for flexible packaging, hygienic, and sanitary use.	It has developed an innovative system that recovers cellulose fibers, aluminum, and polyethylene from end-of-life beverage cartons and transforms them into new products.
Beta	~1850	It manufactures yarn, Nylon6 polymers, for textile flooring, clothing, sportswear, and automotive furnishing.	It has developed an innovative system that recovers caprolactam, a monomer of Nylon6, from end-of-life products such as fishing nets, fabric rugs, and carpet fluff, to regenerate Nylon6 that could be recycled to infinite times.
Gamma	~100	It provides services for collecting and treating sewage including municipal and industrial wastewater.	It has developed an advanced system that treats wastewater in a highly efficient manner thus recovers sludge to be reused in the building sector and chromium to be reused by tanneries.
Delta	~50	It manufactures felts, waddings, paddings, and insulators for the furniture, footwear, construction, and automotive sectors.	It has developed an advanced system that restores the fibrous status of textile scraps, obtained from neighboring organizations, and transforms them into eco-friendly products such as insulation panels.

2.3.2. Data Collection

We collected primary data through in-depth interviews with the top management of case firms. We purposively interviewed the top management because they could provide the best information regarding all aspects of CE implementation. In fact, these interviewees led CE projects in their respective case firms. We developed the case studies protocol, semi-structured interview questionnaire, deduced by the literature to increase the reliability of our research approach. We shortly briefed the purpose of the interview and guaranteed anonymity to the interviewees. All interviews were quite informal and narrative in nature, audio-recorded with permission, and lasted around 60 minutes. Unexpectedly, the interviewees also provided information on R&D, human resources, and logistics, etc. since they have multidisciplinary expertise. In the end, the interviewees were also asked for further comments on CE. Later, the interviews were transcribed and stored in software for rigorous qualitative data analysis via coding. We triangulated the interview data to minimize interviewee hindsight bias, limitations of memory recall, and other issues generally present in qualitative research. In addition, we collected diverse secondary data using archival sources such as corporate sustainability reports, various public interviews, press releases, and official website pages of case firms as described in Table 2.2.

Table 2.2: Description of Data Sources

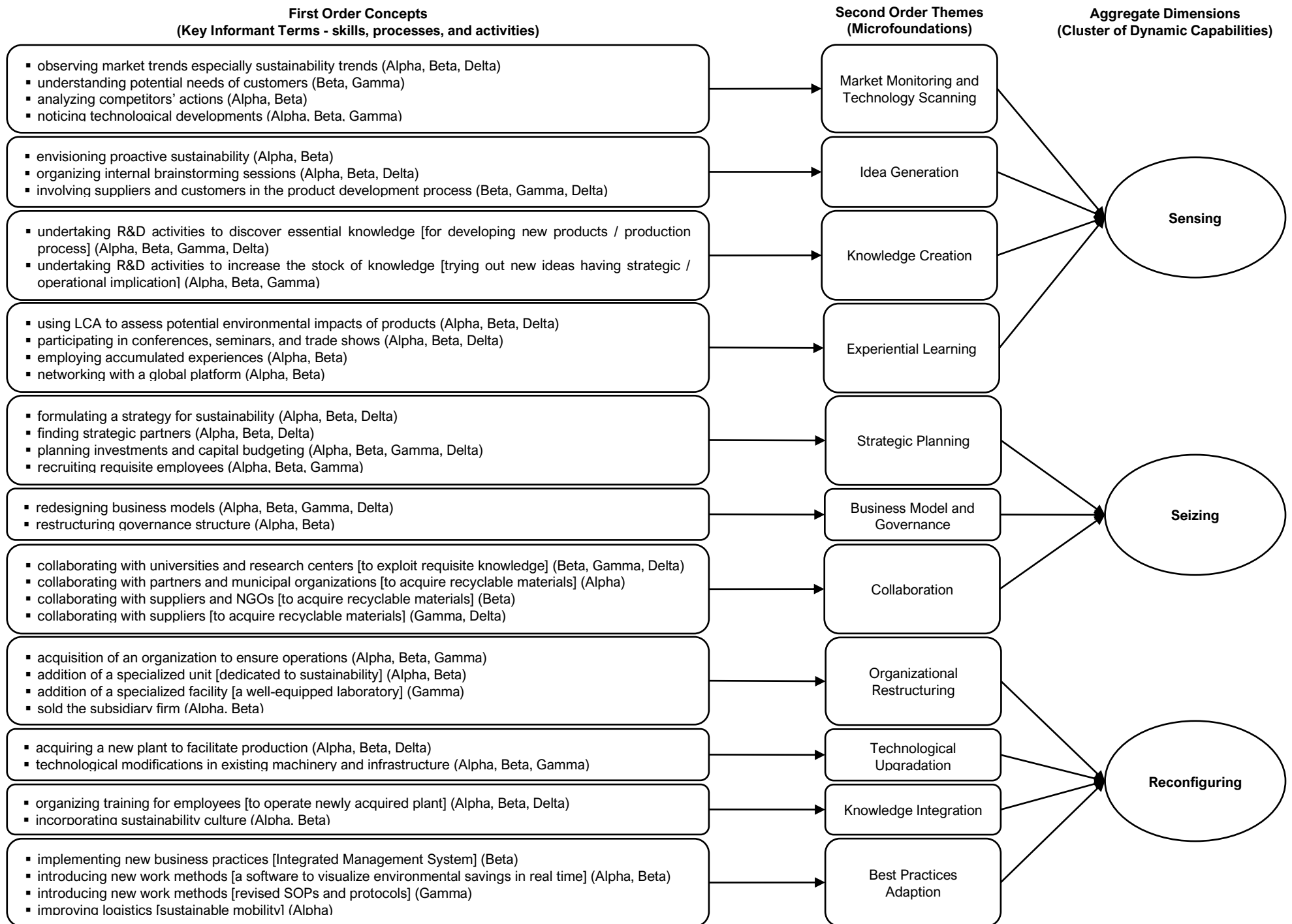
Case Firms	Data Sources	Number of Files Stored in NVivo	Number of NVivo Codes
Alpha	Interview with Top Management	1	29
	Corporate Sustainability Reports	4	72
	Media Interviews / Press Releases	3	6
	Firm Website Pages	8	8
Beta	Interview with Top Management	1	31
	Corporate Sustainability Reports	10	103
	Media Interviews / Press Releases	19	64
	Firm Website Pages	6	13
Gamma	Interview with Top Management	1	23
	Media Interviews / Press Releases	2	2
	Firm Website Pages	11	14
Delta	Interview with Top Management	1	29
	Media Interviews / Press Releases	8	24
	Firm Website Pages	3	8
Total	Interviews with Top Management	4	112
	Corporate Sustainability Reports	14	175
	Media Interviews / Press Releases	32	96
	Firm Website Pages	28	43

2.3.3. Data Analysis

First of all, we created a narrative of each case firm from raw data. Later, we employed a thematic analysis method. We used NVivo 12, a qualitative data analysis software, to compile the collected data into a case study database, to facilitate coding, and to ensure additional rigor (Yin, 2009). In the first part of the analysis, we spotted empirical details that were expressed in the interviews and archival sources. Accordingly, we assigned them an initial coding at a sentence level and wrote analytic memos. This step yielded a structure of coded data that could be categorized, compared, and further analyzed in terms of chosen theoretical approach i.e. dynamic capabilities: sensing, seizing, and reconfiguring (Langley, 1999). In the second part of the analysis, we specifically followed the Gioia Methodology i.e. structuring of data into first-order and second-order categories and then compiling them into aggregated dimensions (Gioia, Corley, & Hamilton, 2012).

In first-order, we coded the data by key informant terms in order to adhere to the concepts that interviewees use and what the archival data contains (Yin, 2009). In second-order, we followed axial coding and principally sought for the relationships among the first-order concepts to develop comprehensive second-order themes. This step got a theoretical basis and focused on nascent concepts. This step included a data reduction of the replicated practices of dynamic capabilities into a theoretical level of themes i.e. microfoundations sensitized by the theoretical framework. Lastly, we distilled second-order themes into aggregate dimensions (Gioia et al., 2012). This step involved the assessment of semantic relationships among the second-order themes. In other words, the second-order themes were coded and aggregated according to whether they support case firms' sensing, seizing, and reconfiguring activities. The outcome of this data structuration process is shown in Figure 2.1.

Figure 2.1: Data Structuration Process



2.4. Findings

2.4.1. Sensing

We noted four microfoundations of sensing, namely (1) market monitoring and technology scanning, (2) idea generation, (3) knowledge creation, and (4) experiential learning. As indicated in the literature review (see section 2.2.1), case firms carried out market monitoring and technology scanning in terms of observing market trends, understanding customer needs, analyzing competitors' actions, and noticing technological developments (Teece, 2007). We noted that case firms did not rely only on one action. Rather, they employed a combination of various actions and/or multiple sources of information for sensing a CE opportunity. This implies that the bigger the scope of market monitoring and technology scanning the higher the probability of finding a CE opportunity would be.

Alpha, Beta, and Delta focused on market trends, especially sustainability trends. Alpha and Beta also focused on competitors' actions. Moreover, Beta and Gamma focused on customer needs. Lastly, Alpha, Beta, and Gamma also focused on technological developments. In short, we found that case firms are very active in market monitoring and technology scanning and it has played a fundamental role in their journey towards CE.

We saw that the trend of sustainability become really substantial, and I must say it is a need if you want to survive in the long-term, . . . when we started to consider the move to a circular model we tried to understand what kind of technologies were available to implement to get there. . . . We found it easy to follow a market trend pulled by a lot of customers and to develop this activity [CE]. (Archival Source, Beta)

Our customers [tanneries] are interested in using a better quality of recovered chromium, every year they [tanneries] are expecting better quality from us, because even their [tanneries'] customers know the environmental message embedded in the use of recovered chromium. (Interviewee, Gamma)

The reason why we started to think about it [eco-friendly product] was a sort of reaction. Honestly, there were some direct competitors that started to produce similar

kind of product from another origin material, not from beverage cartons, but in a marketing position similar to us. (Interviewee, Alpha)

We found that case firms carried out idea generation in line with market monitoring. The top management of Alpha and Beta had already realized sustainability threats to their businesses, so they envisioned a proactive sustainability approach. Alpha, Beta, and Delta organized internal brainstorming sessions. Moreover, Beta, Gamma, and Delta involved suppliers and customers in the product development process.

I realized if we keep doing what we are doing then we will have an end, . . . A perfect company is the one that has no emissions, not disposing anything to landfills, not taking anything from the earth, A group of our employees got together [brainstorm meeting] with universities and institutions [from different countries] to develop the initial concept (Archival Source, Beta)

When we were thinking to launch new products, we brainstorm how to diversify our offers from other products in the market. So, as a blue ocean strategy, we decided to put environmental aspects [CE concept] in our products to be different than others . . . We didn't know which kind of technical characteristics should be in an insulation product . . . So, we started to think about the insulation sector and even we spoke [involved] with some clients. (Interviewee, Delta)

We found that knowledge creation is essential for CE implementation. Case firms constantly conducted R&D activities to discover new opportunities. They mainly focused to discover essential knowledge for developing new products or production processes. It is understood that R&D activities require significant investments. Nevertheless, they also tried out new ideas having strategic or operational implications which increased their stock of knowledge.

We started to accelerate our R&D . . . though we could even sell the plastic from beverage cartons, but we decided to put to it in a value proposition [eco-friendly product] so for this reason first we needed knowledge [R&D]. (Interviewee, Alpha)

We studied [R&D] how to create sustainable ingredients with a smaller environmental impact. This meant producing our Nylon6 [product] from a completely different source [waste] . . . Our R&D team is constantly experimenting with new materials . . . Our commitment to R&D has allowed us to become a leading player [of the industry] and one of the first to apply the concept of circular economy. (Archival Source, Beta)

We found that experiential learning is important to sense a CE opportunity. In particular, we found that the Life Cycle Assessment (LCA) played a significant role. Alpha, Beta, and Delta conducted LCA to assess the environmental impacts of their products and production process. Undoubtedly, LCA reveals room for improvement (Daddi, Nucci, & Iraldo, 2017), but these case firms literally sensed such clues from LCA as new ideas. In addition, case firms participated in conferences, seminars, and trade shows. Notably, Alpha and Beta joined a global platform of CE for learning new opportunities and building capacity. Lastly, Alpha and Beta also employed accumulated experiences such as insights from past attempts. Table 2.3 summarizes the overall findings relevant to sensing capabilities.

Thanks to LCA approach, we realized that raw materials were mainly responsible for the environmental impact. This enabled us [in sensing a new opportunity] to finely tune our production system and replace virgin raw materials obtained from non-renewable resources, such as oil, with regenerated materials. (Archival Source, Beta)

[. . .] years ago, we tried to produce the main raw material, caprolactam, that is used in our production process . . . This past experience was very useful in developing . . . Another part of the technology came from the experiences of industry giants which tried to develop such technology but failed (Archival Source, Beta)

Table 2.3: Summary of Findings - Sensing

Dynamic Capabilities	Microfoundations	Case Firms	Supporting Details (Quotes / Archival Data)
Sensing	Market Monitoring & Technology Scanning	Market Trends	Alpha (✓) Beta * (✓) Gamma (–) Delta (✓) ▪ “beverage cartons market was growing . . . companies using it instead of plastics . . . its recovery was growing in Nordic countries . . . So, there was sustainability” (Interviewee, Alpha) ▪ “as the attention towards these themes [sustainability] increased, we decided to launch a line of products” (Interviewee, Delta)
		Consumer Needs	Alpha (–) Beta (✓) Gamma * (✓) Delta (–) ▪ “consumers are becoming sensitive . . . paying attention to what they are buying . . . they would like to know that this product at the end-of-life will not be landfilled” (Archival Source, Beta)
		Competitors' Action	Alpha * (✓) Beta (✓) Gamma (–) Delta (–) ▪ “it [idea] came from the experiences of industry giants [competitors] which tried to develop such technology but failed. . . to use it with post-consumer waste. So, our invention . . .” (Archival Source, Beta)
		Technological Developments	Alpha (✓) Beta (✓) Gamma (✓) Delta (–) ▪ “we have created an internal organization constantly focused on . . . researching significant competitive advantages, . . . focuses on advancements in technology” (Archival Source, Alpha) ▪ “we tried to understand what kind of technologies were available to get there [to reach CE]” (Archival Source, Beta) ▪ “we have been continuously and deeply studying new technologies with a view to maximize process efficiency” (Archival Source, Gamma)
	Idea Generation	Envisioning Proactive Sustainability	Alpha (✓) Beta * (✓) Gamma (–) Delta (–) ▪ “developing new ideas . . . starting from the choice of raw materials, . . . designing the most environmentally friendly solutions for customers and distributing our products with the least environmental impact possible” (Archival Source, Alpha)
		Brainstorming Sessions	Alpha (✓) Beta * (✓) Gamma (–) Delta * (✓) ▪ “we organize some roundtables [brainstorm sessions] . . .” (Interviewee, Alpha)
		Involving Suppliers and Customers	Alpha (–) Beta (✓) Gamma (✓) Delta * (✓) ▪ “our customers were the source and inspiration of innovation . . . the active involvement of suppliers played a vital role in developing this idea” (Archival Source, Beta) ▪ “to meet all regulations and productive needs, . . . our process has been continuously and deeply studied . . . now we see great interest [involvement] from tanneries in these improvements” (Archival Source, Gamma)
	Knowledge Creation	Developing New Products / Production Process	Alpha * (✓) Beta * (✓) Gamma (✓) Delta (✓) ▪ “we developed an innovative process [through R&D]” (Archival Source, Gamma) ▪ “we thought to put environmental aspects in our products . . . So, we did research on different ways to give some value to these aspects of the product” (Interviewee, Delta)
		Trying Out New Ideas	Alpha (✓) Beta * (✓) Gamma (✓) Delta (–) ▪ “R&D is constantly making efforts on improving production efficiencies and reducing the environmental impacts of products and process” (Archival Source, Alpha) “we are studying [R&D] about the improvements . . . We are trying to produce a better product, recovered chromium, that could go directly to the tanning process” (Interviewee, Gamma)
		LCA	Alpha (✓) Beta * (✓) Gamma (–) Delta (✓) ▪ “we carried out an LCA which revealed that to reduce . . . we need to focus all our resources on enhancing the use of recovered fibers when selecting raw materials” (Archival Source, Alpha) ▪ “we conducted an LCA study . . . which made it possible for us to obtain an even more ecological version of the product [a product that joins CE]” (Archival Source, Delta)
	Experiential Learning	Participation in Events	Alpha (✓) Beta (✓) Gamma (–) Delta (✓) ▪ “we regularly participate in conferences, seminars, trade shows etc. Honestly, it helped us, especially those events that create a little bit of networking” (Interviewee, Alpha) ▪ “participate in conferences, workshops, and business exhibitions” (Archival Source, Beta) ▪ “I started to go conferences and trade fairs for learning about CE” (Interviewee, Delta)”

	Accumulated Experiences	Alpha	(✓)	▪ “over 60 years of expertise allowed us to develop the know-how and the technology necessary for these objectives [CE]” (Archival Source, Alpha)
		Beta *	(✓)	
		Gamma	(—)	
		Delta	(—)	
	Networking with Global Platform	Alpha	(✓)	▪ “joined [a global platform] to realize circular economy ambitions faster. This program was established to enable organizations to develop new opportunities . . . The network focuses on collaboration, capacity building, networking and research” (Archival Source, Alpha)
		Beta	(✓)	
		Gamma	(—)	
		Delta	(—)	

Note:

- * A block quotation of this case firm is presented in section 2.4.1.
- (✓) This particular microfoundation is found in the case firm.
- (—) Any supporting detail is not found. However, the case firm might or might not possess this particular microfoundation.

2.4.2. Seizing

We noted three microfoundations of seizing, namely (1) strategic planning, (2) business model and governance, and (3) collaboration. Case firms carried out strategic planning in terms of formulating a strategy, finding strategic partners, planning investments and capital budgeting, and recruitment of employees. Alpha, Beta, and Gamma purposively planned human resources for CE objectives. They also looked for the right strategic partners. In contrast, Delta already has well-established contact with suppliers since it is located in an industrial cluster. Most importantly, we found that case firms strongly focused on planning investments and capital budgeting. Undoubtedly, this key aspect of their strategies significantly contributed to CE implementation.

After various intermediate stages in reaching a sustainability policy, we formalized a structure, a detailed plan [for CE objective] . . . we employed a number of human resources, direct employees and temporary employees, dedicated to the development of technology and to support the policy. (Archival Source, Beta)

To accelerate this kind of business, finding the right partners is really important . . . we developed a partnership with [manufacturer of beverage cartons] . . . we planned and decided on making some key investments . . . this project [CE] began [. . .] years ago with an investment of [. . .] million Euros. (Archival Source, Alpha)

We noted that case firms redesigned their business models. It seems that the redesigning of business models is a fundamental condition to seize a CE opportunity. In addition, Alpha and Beta restructured their governance structure. They made changes in the board of directors and executive management to streamline their strategies and to enrich collaboration with partners. Whereas, Gamma and Delta did not change their governance structure.

We realized that if we didn't change our business model sooner or later, we would have gone out of the business. So, we said why don't we completely change our way of thinking, and we think that the change [CE business model] is a way to be more competitive and is a way to grow. (Archival Source, Beta)

The Board of Directors [5 members], who have the necessary expertise for responsible management of the company with respect to the strategic plan they have drawn up for [CE], were appointed by the Member Assembly . . . The Board of Directors appointed a Supervisory Committee who was responsible for overseeing the proper implementation of the model [CE business model]. (Archival Source, Alpha)

We found that collaboration is also essential for CE implementation. Case firms mainly collaborated to acquire the requisite knowledge and/or to acquire requisite resources. Beta, Gamma, and Delta collaborated with universities and research centers in order to acquire requisite knowledge. In other words, these firms exploited the capabilities of research institutions. Alpha collaborated with partners and municipal organizations in order to acquire requisite resources (recyclable materials). Beta collaborated with suppliers and NGOs, whereas, Gamma and Delta collaborated with suppliers for the above-mentioned purpose. Table 2.4 summarizes the overall findings relevant to seizing capabilities.

In the beginning, our focus was on the chemical characteristics how to make . . . as efficient as possible. So, we mobilized a number of stakeholders, university laboratory, technical institute, and we focused on . . . (Interviewee, Beta)

At the same time, we are studying [R&D] about improvements in collaboration with [a research institute] because [this research institute] has all the capabilities and knowledge to understand very well what could be necessary to remove [contaminants] from recovered chromium that should not go to tanneries (Interviewee, Gamma)

No one [firm] can be sustainable alone, it is always a supply chain effort . . . In our case, we are collaborating with firms, NGOs, and entities even from outside of our supply chain . . . In this adventure [CE journey], the collaboration with every potential partner was essential (Archival Source, Beta)

Table 2.4: Summary of Findings - Seizing

Dynamic Capabilities	Microfoundations	Case Firms	Supporting Details (Quotes / Archival Data)
Seizing	Strategic Planning	Strategy for Sustainability	Alpha (✓) Beta * (✓) Gamma (—) Delta (✓) ▪ “we developed a sustainability strategy” (Archival Source, Alpha) ▪ “we took some decisions [for CE] . . . we decided to take raw materials only from nearby . . . decided to use only recycled polyethylene for packaging” (Interviewee, Delta)
		Finding Strategic Partners	Alpha * (✓) Beta (✓) Gamma (—) Delta (✓) ▪ “we looked for suppliers that tend to become partners” (Interviewee, Beta) ▪ “we already had the suppliers that can supply the materials” (Interviewee, Delta)
		Planning Investments & Capital Budgeting	Alpha * (✓) Beta (✓) Gamma (✓) Delta (✓) ▪ “after [. . .] years of R&D and [. . .] million euros invested, we inaugurated a plant . . . dedicated to the production of regenerated Nylon6.” (Archival Source, Beta) ▪ “planned investments in R&D” (Archival Source, Gamma) ▪ “we decided to make an investment to buy a new plant” (Interviewee, Delta)
		Recruiting Employees	Alpha (✓) Beta * (✓) Gamma (✓) Delta (—) ▪ “recruited employees [for CE objectives]” (Archival Source, Alpha) ▪ “we needed to have people with high educational qualifications . . . engineers and chemists with this kind of knowledge.” (Interviewee, Gamma)
	Business Models & Governance	Redesigning Business Models	Alpha (✓) Beta * (✓) Gamma (✓) Delta (✓) ▪ “introduced new products based on the recovery of end-of-life beverage cartons” (Archival Source, Alpha) ▪ “recovers chromium from sludge [and sell it] to be reused by tanneries [customers]” (Archival Source, Gamma) ▪ “introduced eco-friendly products [insulation panels] based on recycling of textile scraps” (Archival Source, Delta)
		Restructuring Governance Structure	Alpha * (✓) Beta (✓) Gamma (—) Delta (—) ▪ “the Board of Directors was joined by two representatives [from stakeholders] . . . the Executive Management Committee was responsible for implementing [CE]” (Archival Source, Beta)
	Collaboration	to Exploit Requisite Knowledge	Alpha (—) Beta * (✓) Gamma * (✓) Delta (✓) ▪ we started to collaborate with [university name], we signed with them a program for the development of acoustic tests on our products (Interviewee, Delta)
		to Acquire Recyclable Materials	Alpha (✓) Beta * (✓) Gamma (✓) Delta (✓) ▪ “collaborating with a partner [manufacturer of beverage cartons] and municipal organizations [waste collectors]” (Archival Source, Alpha) ▪ “collaborating with suppliers [tanneries]” (Archival Source, Gamma) ▪ “collaborating with suppliers [neighboring textile firms]” (Archival Source, Delta)

Note:

- * A block quotation of this case firm is presented in section 2.4.2.
 (✓) This particular microfoundation is found in the case firm.
 (—) Any supporting detail is not found. However, the case firm might or might not possess this particular microfoundation.

2.4.3. Reconfiguring

We noted four microfoundations of reconfiguring, namely (1) organizational restructuring, (2) technological upgradation, (3) knowledge integration, and (4) best practices adaptation. Case firms carried out organizational restructuring in terms of acquisition of an organization, addition of a specialized unit or facility, and abandonment or selling of a subsidiary firm. Alpha and Beta sold a subsidiary firm and a business unit respectively with an intention to primarily focus on CE business. It actually provided capital gain which facilitated capital budgeting to implement their strategic plans for CE. In fact, they also acquired an organization in order to ensure operations pertinent to the CE business. Likewise, Gamma also opted to takeover a nearby firm (a plant). This synergistic and systematic interaction between the two plants was essential to optimize the overall process pertinent to the CE business. In addition, Gamma established a facility (a well-equipped laboratory) to achieve CE objectives. Alpha and Beta established specialized units dedicated to sustainability. We found that these specialized units played a significant role in their journey towards CE.

We considered to purchase it [recyclable materials] from the existing operators . . . but we ended up deciding to take things in our own hands [acquisition of an organization], we invested to make sure that we could have a continuous supply. (Interviewee, Beta)

To address these problems, a new plant under the control of [another firm] was expressly constructed . . . it [another firm plant] became a branch of our plant [by merger] which enabled further optimization of all processes, thanks to the synergic and systematic interaction between the two plants (Archival Source, Gamma)

Our organizational structure was changed due to the addition of a new business unit. It assists other business units on the subjects of energy, recycling, and the culture of sustainability. . . . these efforts [new business unit activities] culminated the launch of . . . which enabled us to become a benchmark in the circular economy. (Archival Source, Beta)

Technological upgradation is essential to address a CE opportunity. Alpha, Beta, and Delta acquired new plants to produce products based on recycled materials. Nevertheless, they also made technological modifications in their existing machinery and infrastructure. These

modifications include but are not limited to the installation of energy-efficient motors, compressors, automation, ERP, ICT system and so on.

We decided to make a significant investment in the new plant . . . the level of automation [of the new plant] guarantees and protects the high quality of the increasingly specialized and sophisticated production required. It also let us adopt a new type of packaging, more than 80% of which can be recycled. (Archival Source, Beta)

Over the years, we have experienced both structural and technological evolution. . . . We installed a centralized remote-control system that monitors each operating machine inside the plant, besides this the automation system also provides real-time data collection and analysis. (Archival Source, Gamma)

We provided technical training to the production people concerning the new plant for this project [CE activity]. . . . We encouraged sustainability culture . . . a day training was provided for top management, sales, marketing, and communication personnel on topics such as sustainability and LCA (Interviewee, Alpha)

We found that knowledge integration is also important for CE implementation. Alpha, Beta, and Delta organized technical training for their employees (production workers) in order to operationalize newly acquired plants. Moreover, Alpha and Beta incorporated sustainability culture through various actions. Lastly, we found that case firms also adopted new business practices, procedures, and work methods. Best practices adaptation attributes to reconfiguring in general. However, it also indirectly supported CE objectives. Alpha particularly adopted sustainable mobility to support CE implementation. Table 2.5 summarizes the overall findings relevant to reconfiguring capabilities.

Table 2.5: Summary of Findings - Reconfiguring

Dynamic Capabilities	Microfoundations	Case Firms	Supporting Details (Quotes / Archival Data)
Reconfiguring	Organizational Restructuring	Acquisition of an Organization	Alpha (✓) Beta * (✓) Gamma * (✓) Delta (—) ▪ “accelerated development [CE] through the acquisition of a company” (Archival Source, Alpha)
		Addition of a Unit / Facility	Alpha (✓) Beta * (✓) Gamma (✓) Delta (—) ▪ “created an internal organizational focused on sustainability . . . developing new ideas and researching significant competitive advantages” (Archival Source, Alpha) ▪ “laboratory was modified [for CE objectives] and transferred in a new bigger location . . . new instruments and modern accessories were installed” (Archival Source, Gamma)
		Abandonment of Subsidiary	Alpha (✓) Beta (✓) Gamma (—) Delta (—) ▪ “implementing a broader strategic plan aimed at refocusing group activities [for CE objectives], the subsidiary [based in another country] was sold” (Archival Source, Alpha) ▪ “business unit was transferred [sold] to [another firm] with the aim to concentrate the resources made available for the development of [CE activity]” (Archival Source, Beta)
	Technological Upgradation	Acquiring a New Plant	Alpha (✓) Beta * (✓) Gamma (✓) Delta (—) ▪ “established a new plant [to manufacture eco-friendly products]” (Archival Source, Alpha) ▪ “we decided to make an investment to buy a new plant, specialized for manufacturing this product [a product that joins CE]” (Interviewee, Delta)
		Modifications in Existing Assets	Alpha (✓) Beta (✓) Gamma * (✓) Delta (—) ▪ “many modifications [for CE objectives] e.g. energy-efficient motors, compressors, heat recovery system, DCS/QCS system, ERP, & ICT system etc.” (Archival Source, Alpha) ▪ “number of modifications were made [for CE objectives] e.g. installation of compressors, heat recovery system, automation, ICT system etc.” (Archival Source, Beta)
	Knowledge Integration	Training of Employees	Alpha * (✓) Beta (✓) Gamma (—) Delta (✓) ▪ “training was organized for the new plant” (Archival Source, Beta) ▪ “yes, off course they had to learn how to work with the new plant” (interviewee, Delta)
		Sustainability Culture	Alpha * (✓) Beta (✓) Gamma (—) Delta (—) ▪ “promoted the culture of sustainability inside our group by continuous training of employees . . . also promoted the culture of sustainability among suppliers” (Archival Source, Beta)
	Best Practices Adaptation	New Business Practices	Alpha (—) Beta (✓) Gamma (—) Delta (—) ▪ “to reduce the use and disposal of packaging [to support CE objectives] we needed to have an Integrated Management System (IMS)” (Archival Source, Beta)
		New Work Methods	Alpha (✓) Beta (✓) Gamma (✓) Delta (—) ▪ “we have created an innovative tool, Environmental Savings Calculator” (Archival Source, Alpha) ▪ “each plant can access the tool . . . They can visualize collected data and calculate the process of environmental indicators in real-time” (Archival Source, Beta) ▪ “revised SOPs and protocols e.g. analytical methods, testing parameters, sampling frequencies etc.” (Archival Source, Gamma)
		Improving Logistics	Alpha (✓) Beta (—) Gamma (—) Delta (—) ▪ “we developed an ambitious sustainable mobility project [to support CE objectives]” (Archival Source, Alpha)

Note:

- * A block quotation of this case firm is presented in section 2.4.3.
 (✓) This particular microfoundation is found in the case firm.
 (—) Any supporting detail is not found. However, the case firm might or might not possess this particular microfoundation.

2.5. Discussion

We attempted to address a research gap on dynamic capabilities for corporate sustainability and CE (Amui et al., 2017; Prieto-Sandoval, Jaca, Santos, Baumgartner, & Ormazabal, 2019). We focused on how case firms sensed and addressed CE opportunities. In doing so, we noticed that the dimensions of dynamic capabilities for CE are not so isolated (Q. Wu et al., 2012). In fact, sensing, seizing, and reconfiguring is a sequential process through which case firms accomplished CE. However, in the past, scholars unintentionally overlooked this sequential process for CE. Pieroni et al. (2019) reveal that most proposed CE approaches address only individual stages of CE-oriented BMI instead of considering continuous activities necessary to cope with the rapidly changing environment. We argue that a holistic approach is necessary for CE implementation. In fact, we found that case firms employed various microfoundations (skills, processes, and organizational activities) through which they successfully identified and addressed CE opportunities (see Figure 2.1).

According to Barreto (2010), if a capability enhances an organization's ability to identify opportunities and threats, make decisions, solve problems, and modify existing resources then it is referred to as a dynamic capability (Amui et al., 2017). As one of the initial steps towards CE, Alpha, Beta, and Delta employed LCA which significantly facilitated them in sensing a CE opportunity. Thus, LCA is not only a dynamic capability but an essential tool or prime source for sensing a CE opportunity. Our finding on the role of LCA implies that organizations aiming towards CE should adopt LCA (Niero & Rivera, 2018). Indeed, the significance of LCA has been also observed in the development of green products (Dangelico & Pujari, 2010), sustainable innovations (Mousavi & Bossink, 2017), and industrial symbiosis (Daddi et al., 2017). Failure in identifying profitable opportunities is a fundamental barrier to eco-innovation (Porter & Linde, 1995). However, the existence of procedures or capabilities such as EMAS and LCA helps organizations in eco-innovation by eliminating that barrier (Daddi, Magistrelli, Frey, & Iraldo, 2011).

In their journey towards CE, case firms constantly employed R&D which is proven to be a crucial dynamic capability for sensing CE opportunities. It is obvious that R&D aimed at radical innovation needs substantial investment. Therefore, most SMEs only conduct R&D aimed at the improvement of technological processes or to lower the costs of production (Bos-Brouwers, 2009). In contrast, we noticed that case firms (large-sized as well as small-sized

firms) successfully pursued R&D for CE objectives. It is noteworthy that case firms collaborated with research institutions to exploit their knowledge and capabilities (De Marchi, 2012). It implies that CE requires new knowledge that cannot always be developed inside organizations especially in the case of SMEs. In fact, Beta collaborated with both local and international research institutions though it already has a state-of-the-art R&D facility. Our case studies confirm that organizations that pursue both R&D and internationalization succeed well in developing and maintaining sustainability practices (Chakrabarty & Wang, 2012). Prieto-Sandoval et al. (2019) suggest that SMEs should collaborate with research institutions to facilitate eco-innovation. Our case studies provide empirical evidence on the outcome of such collaborative R&D (Prieto-Sandoval et al., 2019).

Porter and Linde (1995) argue that organizations can achieve a competitive advantage by considering environmental issues as core to their business strategies. Beta and Delta developed business strategies considering the environmental impacts of their products. We noticed that Beta and Delta achieved a significant competitive advantage in their respective markets once they launched their products based on recycled materials. Thus, the above-mentioned argument is confirmed in our case studies. However, to develop such business strategies the role of top management is pivotal. Interestingly, case firms began their CE journey even before the commencement of worldwide CE discussion. This could be explicated by the fact that the top management of Alpha and Beta had realized sustainability threats to their businesses long ago. Consequently, they envisioned a proactive sustainability approach. Our finding on the role of the top management supports the notion that organizations that are led by environmentally conscious leaders are more likely to follow CE (Gusmerotti et al., 2019).

To address newly sensed CE opportunities, case firms strongly focused on planning investments and capital budgeting. In this regard, the role of top management was again quite pivotal since such decisions usually involve high risks. It is noteworthy that top management may encounter paradoxical tensions in CE decisions (Daddi, Ceglia, Bianchi, & de Barcellos, 2019). In fact, in Beta, initially, no one (top management members) was willing to pursue CE except the CEO (an environmentally conscious leader). It implies that top management should possess a risk-taking ability in pursuit of CE. The significance of such risk-taking ability has been also noticed in other corporate sustainability strategies such as cleaner technology implementation (Bhupendra & Sangle, 2015). Agarwal and Helfat (2009) found that resource

allocation and investments, as part of the strategic planning process, is crucial for organizations' performance. Furthermore, Agarwal and Helfat (2009) argue that resource allocation and investment not only involve investment in R&D but also involve gaining technological capabilities through acquisitions. In line with this argument, our case studies demonstrate that investments in R&D and acquisitions play a major role in CE implementation.

Our case studies show that the redesigning of business models is a fundamental dynamic capability for CE (Pieroni et al., 2019). Case firms followed the CE business model based on resource recovery (Accenture, 2014). To operationalize such a CE business model, our case studies indicate that collaboration is quite essential. This finding is consistent with previous studies that found collaboration is essential to address environmental challenges (Hofmann et al., 2012). We noticed that case firms collaborated with multiple actors such as suppliers, research institutions, public institutions, and NGOs. It implies that an organization on its own may not accomplish CE. Thus, organizations aiming towards CE should seek suitable actors for collaboration. However, often it is not so easy to manage such collaborations (Mousavi & Bossink, 2017). In fact, Alpha and Beta restructured their governance structures to streamline their business strategies and to manage such collaborations. Our case studies indicate that CE requires technological innovation as well as management innovation. Moreover, our case studies show that organizational restructuring and technological upgradation are crucial dynamic capabilities for CE implementation. To support both structural and technological changes, case firms adjusted their human resources and provided the necessary training to employees (Kabongo & Boiral, 2017).

2.6. Conclusion

The objective of this paper was to enhance the understanding of microfoundations of dynamic capabilities that facilitate CE implementation. This paper contributes to the literature by providing empirical evidence of sensing, seizing, and reconfiguring capabilities for CE business opportunities. Our case studies demonstrate that dynamic capabilities facilitate CE implementation. Hence, organizations should develop and apply dynamic capabilities for CE objectives. In short, organizations may apply four microfoundations of sensing, namely (1) market monitoring and technology scanning, (2) idea generation, (3) knowledge creation, and (4) experiential learning, to identify CE business opportunities. Once a CE opportunity is sensed, organizations may address that opportunity through three microfoundations of seizing,

namely (1) strategic planning, (2) business model and governance, and (3) collaboration, and four microfoundations of reconfiguring, namely (1) organizational restructuring, (2) technological upgradation, (3) knowledge integration, and (4) best practices adaptation.

This paper provides a framework comprised of particular skills, processes, and organizational activities that underlie sensing, seizing, and reconfiguring dynamic capabilities (see Figure 2.1). This framework could be useful for both scholars and practitioners in any context. In addition, this paper points out some managerial and policy implications. According to our findings, LCA and R&D cover a relevant role in sensing capability. Therefore, managers seeking CE business opportunities should increase LCA skills among employees in order to improve the sensing capacity of their organizations. Similarly, policymakers can further promote CE by providing incentives to organizations for LCA adoption and R&D. By incentivizing LCA adoption and organizations' investments in R&D, policymakers can apply the European Commission and international policy objectives on CE. In addition, our case-studies reveal that the role of top management is pivotal to address CE business opportunities. Therefore, organizations that want to pursue CE business opportunities should include CE in the organizational structure. CE objectives should be clearly defined, human and financial resources allocated, and all top managers of the organization should be informed or invited to contribute to those objectives. On the other side, policymakers should positively influence the perception of top managers and entrepreneurs regarding CE in order to stimulate their commitment toward CE actions. To achieve this objective, the adoption of policy actions such as tax breaks or regulatory relief, to reward organizations that have successfully adopted CE, could be very effective.

Next to its merits, this paper has its limitations too. This paper is limited to the data of only 4 successful CE business cases. The interviews were only conducted with the top management of case firms. In fact, CE implementation is a complex process and the role of employees is crucial. Therefore, the interviews with employees from departments such as R&D, production, human resources, finance, and procurement could provide more insights. However, we could not interview those employees or include more case firms for various reasons including lack of response from organizations, lack of time, unavailability of data, and geographic limitations, etc. This paper opens up future research avenues. For instance, future studies may conduct a similar study in other countries or in different contexts to get more valuable insights. A longitudinal study on the evolution of an organization's dynamic

capabilities for CE implementation would be valuable. Future studies may investigate what are the commonalities in microfoundations among organizations participating in CE or how they differ from the presented microfoundations. Lastly, future studies may investigate the influence of presented dynamic capabilities on the performance of organizations undertaking CE initiatives.

CHAPTER 3

Key Dynamic Capabilities and Routines of Organizations for Circular Economy Implementation: Evidence from the Manufacturing Sector

Redrafted from:

Khan, O., Daddi, T., & Iraldo, F. (submitted). **Sensing, seizing, and reconfiguring: Key capabilities and organizational routines for circular economy implementation.** *Journal of Cleaner Production*

3.1. Introduction

Scholars have been strongly advocating the benefits of circular economy (CE) implementation (Merli et al., 2018). They mainly highlight that CE implementation might lead to sustainable development (Ghisellini et al., 2016). Notably, the Ellen MacArthur Foundation (2013) shows that CE has a huge potential to overcome sustainability challenges by improving resource productivity. Therefore, the EU and several national governments have been urging organizations for CE implementation (Korhonen, Honkasalo, & Seppälä, 2018). Yet most organizations are failing in translating the CE concept into their business operations due to various challenges (Ormazabal et al., 2018). It is worth mentioning that most organizations are not able to capitalize on CE opportunities because their strategies and business operations are mainly based on a linear economy (Accenture, 2014). Scholars suggest that organizations should develop new (or dynamic) capabilities to reorganize their strategies and business operations (Lacy & Rutqvist, 2015). However, how organizations can develop and exploit such capabilities, though an important question, is not yet well-explored. Furthermore, another important question, what particular skills, processes, and organizational routines are needed for CE implementation is not yet well-explored.

Teece et al. (1997) define dynamic capabilities as *“the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environment”* (p. 516). They argue that organizations can accomplish a sustainable competitive advantage through dynamic capabilities. Teece (2007) points out that dynamic capabilities are processes and/or activities through which an organization reconfigures its strategy and resources. Scholars perceive that CE can provide a sustainable competitive advantage to organizations. However, the transition towards CE is not so simple rather a complex process that demands an organizational change (Ritzén & Sandström, 2017). Mousavi et al. (2018) point out that the ability and willingness of an organization to implement an organizational change is dependent on its dynamic capabilities. Hence, dynamic capabilities are crucial for achieving CE (O. Khan et al., 2020). Kabongo and Boiral (2017) and O. Khan et al. (2020) show that dynamic capabilities facilitate CE implementation. However, the findings of these two case studies may not be generalized. Hence, the role of dynamic capabilities for CE implementation needs to be further explored and thoroughly tested.

To contribute to this knowledge gap, we investigate whether or not dynamic capabilities, that is, sensing, seizing, and reconfiguring (Teece, 2007), facilitate CE implementation. If so, which are the most important dynamic capabilities for CE implementation. Winter (2003) argues that dynamic capabilities are an aggregation of organizational routines through which organizations achieve new resource configurations. Therefore, we further investigate which are the most important organizational routines that might facilitate CE implementation. The theory of dynamic capabilities has been increasingly used in both strategic management studies (Zahra et al., 2006) and corporate sustainability studies (Annunziata et al., 2018; Hofmann et al., 2012; Q. Wu et al., 2013). Yet this theory remains underused particularly in environmental management studies (Daddi et al., 2018). Scholars have just recently begun to use this theory in the CE context (Kabongo & Boiral, 2017; O. Khan et al., 2020; Scarpellini, Marín-Vinuesa, et al., 2020; Scarpellini, Valero-Gil, et al., 2020). Therefore, by using this theory, we do not only investigate important questions but also respond to the research calls that demand more research on dynamic capabilities for CE (Prieto-Sandoval et al., 2019) and corporate sustainability (Amui et al., 2017).

This paper contributes to the literature of both dynamic capabilities and CE in the following ways. This paper empirically assesses the role of dynamic capabilities, that is, sensing, seizing, and reconfiguring, in CE implementation using the partial least squares structural equation modeling (PLS-SEM). This paper presents the measurement scales of dynamic capabilities and demonstrates how to operationalize a reflective-formative hierarchical component model (HCM) of dynamic capabilities in PLS-SEM (Sarstedt, Hair, Cheah, Becker, & Ringle, 2019). This paper highlights the key capabilities and organizational routines through which organizations can identify and pursue CE opportunities. The rest of this paper proceeds as follows. Next section 3.2 presents the theoretical framework and accordingly formulates the hypotheses. Section 3.3 describes how the constructs are operationalized, data is collected, and hypotheses are tested. Section 3.4 presents the results, whereas section 3.5 discusses the main results and their implications. Finally, section 3.6 concludes the discussion, highlights the limitations and suggests some future research opportunities.

3.2. Theoretical Framework and Hypotheses

Teece and Pisano (1994) introduced the concept of dynamic capabilities as a response to compensate shortcomings of the resource-based view (RBV). However, the concept of

dynamic capabilities surpassed another existing concept, that is, the VRIN framework (Barney, 1991) which argues that *“sustainable competitive advantage is based on a firm’s acquisition of valuable, rare, inimitable and non-substitutable (VRIN) resources”*. Teece et al. (1997) presented the definition of dynamic capabilities as *“the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environment”* (p. 516). Many scholars have attempted to redefine and expand the concept of dynamic capabilities (Eisenhardt & Martin, 2000; Winter, 2003; Zahra et al., 2006). Notably, Teece (2007) further explained that dynamic capabilities can be classified in the capacity as *“(1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the firm’s intangible and tangible assets”* (p. 1319). In short, dynamic capabilities can be referred to as sensing, seizing, and reconfiguring capabilities, which are undergirded by microfoundations that are comprised of distinct skills, processes, and organizational routines (Teece, 2007).

Hart (1995) stated that organizations might encounter various unexpected challenges during their transition to corporate sustainability. This statement is also valid in the case of organizations aiming towards CE. For instance, some studies found that organizations are not easily able to adopt CE due to various challenges including, but not limited to, technological, organizational, and financial problems (Ormazabal et al., 2018; Ritzén & Sandström, 2017). Nevertheless, scholars argue that both corporate sustainability (Strauss et al., 2017) and CE (Ritzén & Sandström, 2017) essentially requires an organizational change. Hence, dynamic capabilities are crucial for attaining both corporate sustainability (Strauss et al., 2017) and CE (O. Khan et al., 2020; Scarpellini, Marín-Vinuesa, et al., 2020). Put differently, the dynamic capabilities of an organization determine its ability and willingness to implement the required changes for corporate sustainability (Mousavi et al., 2018). Wu et al. (2013) pointed out that *“whether firms can overcome sustainability challenges lies in the development and application of their dynamic capabilities”* (p. 257). This statement on the significance of dynamic capabilities has been confirmed by some recent studies. For instance, Mousavi and Bossink (2017) show that to reduce environmental impacts and dependency on fossil fuels, KLM Royal Dutch Airlines accomplished sustainable innovation by developing and applying dynamic capabilities.

Scholars suggest that organizations must emphasize on identification and development of dynamic capabilities to attain corporate sustainability (Annunziata et al., 2018). However,

in the CE context, what are those mechanisms by which organizations can develop and apply dynamic capabilities particularly for CE objectives is not yet comprehensively explored. Kabongo and Boiral (2017), a very first study on this topic, explained a four-stage process as (i) local extermination, (ii) internal operationalization, (iii) cross-functional integration, and (iv) strategic consolidation. More recently, O. Khan et al. (2020) indicated various microfoundations, that is, skills, processes, and organizational activities, through which the referred case firms accomplished CE objectives. These two studies give a clue that dynamic capabilities might facilitate CE implementation. However, the insights of these case studies may not be generalized. To the best of our knowledge, the role of dynamic capabilities, that is, sensing, seizing, and reconfiguring, in CE implementation is not yet empirically assessed or statistically tested. Furthermore, the key capabilities and organizational routines for CE implementation remain unexplored. Therefore, we propose our main research question as following:

RQ: Do sensing, seizing, and reconfiguring capabilities facilitate CE implementation? If yes, which are the most important capabilities and organizational routines for CE implementation?

Sensing capabilities can be referred to as a set of activities that primarily focus on scanning, learning, and interpretation in order to identify new opportunities (O. Khan et al., 2020). Teece (2007) highlights that sensing activities of organizations usually involve the understanding of customer needs and latent demands, analyzing market development, and observing their suppliers' feedback and competitors' actions. R&D is another important sensing activity. It is suggested that organizations, especially manufacturing organizations, must continuously explore new (or developing) technologies in both local and foreign markets (Teece, 2007). In short, the main objective of sensing is to identify and shape emerging opportunities by providing market intelligence. Mousavi et al. (2018) substantiated that organizations' sensing capabilities positively contribute to sustainable innovation. Porter and Linde (1995) point out that organizations often encounter failure in identifying profitable opportunities due to the lack of appropriate capabilities. O. Khan et al. (2020) show that the referred case firms successfully identified profitable CE opportunities through their sensing capabilities. Hence, we may assume that organizations having appropriate sensing capabilities are more likely to identify CE opportunities. Accordingly, we propose our first hypothesis as following (see Figure 3.1):

H1: Organizations' sensing capabilities have a positive relationship with circular economy implementation

Seizing capabilities can be referred to as a set of activities that primarily focus on the implementation of newly identified opportunities (O. Khan et al., 2020). Seizing can also be referred to as a process, that is, mobilizing internal and external resources and/or competencies, to pursue identified opportunities conducive to competitive advantage. Mousavi et al. (2018) substantiated that organizations' seizing capabilities positively contribute to sustainable innovation. Teece (2007) points out that the managerial skills required for both sensing and seizing are quite different. Put differently, an organization might have succeeded in identifying an opportunity, yet it may fail to seize that opportunity. To seize identified opportunities effectively, Teece (2007) suggests that organizations must be able to: (i) take good investment decisions, (ii) select or create appropriate (new) business models, (iii) improve technological competences, and (iv) maintain their assets. O. Khan et al. (2020) show that the referred case firms accomplished CE opportunities through their seizing capabilities. Hence, we may assume that organizations having appropriate seizing capabilities are more likely to accomplish an identified CE opportunity. Accordingly, we propose our second hypothesis as following (see Figure 3.1):

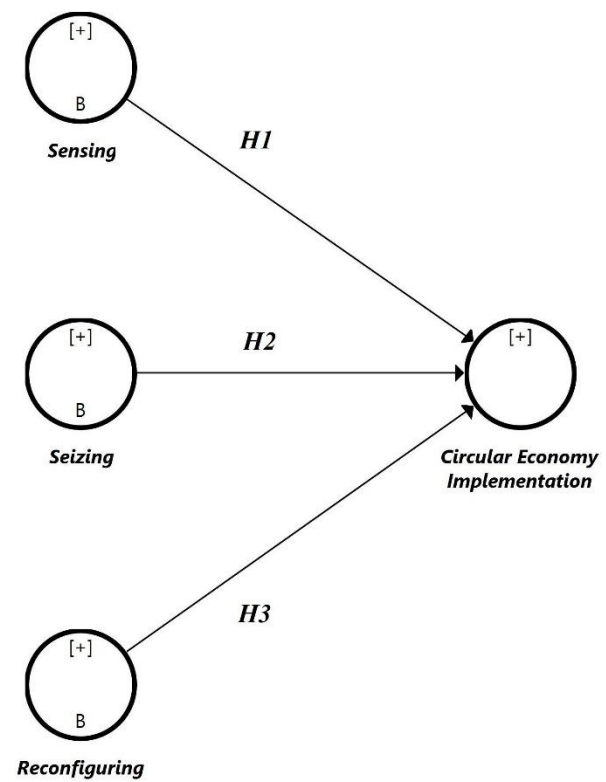
H2: Organizations' seizing capabilities have a positive relationship with circular economy implementation

Reconfiguring capabilities can be referred to as the ability of an organization to recombine its resource base and/or reconfigure new resources in order to accomplish an identified opportunity (O. Khan et al., 2020; Teece et al., 1997). Mousavi et al. (2018) substantiated that organizations' reconfiguring capabilities positively contribute to sustainable innovation. It is worth noting that the reconfiguring capabilities are mainly underpinned in the routines of an organization. That is, these routines are responsible for the renewal and orchestration of resources and competencies (Teece, 2007). Reconfiguring is an iterative process that depends on an organization's internal and external environment. It is worth mentioning that minor adjustments in the resource base could be sufficient to exploit present opportunities. However, an organization would need a more extensive renewal of resources whenever the external (or business) environment changes (Helfat et al., 2007). O. Khan et al.

(2020) show that the referred case firms accomplished CE opportunities through their reconfiguring capabilities. Hence, we may assume that organizations having appropriate reconfiguring capabilities are more likely to accomplish an identified CE opportunity. Accordingly, we propose our third hypothesis as following (see Figure 3.1):

H3: Organizations' reconfiguring capabilities have a positive relationship with circular economy implementation

Figure 3.1: Research Model (Hypotheses)



3.3. METHODOLOGY

3.3.1. Questionnaire Development

We developed our questionnaire based on the recommended guidelines (Churchill, 1979). First of all, we identified indicators related to the constructs in question via a comprehensive literature review. This step involved a compilation of indicators already listed in empirical studies and self-creation of indicators based on conceptual studies. Next, we drafted a trial questionnaire, which was later further improved by the feedback from four academicians and practitioners. Afterward, we translated this questionnaire from English to Italian to facilitate the target audience. We assumed that questionnaire in regional language may increase the response rate. Finally, we preliminary tested our questionnaire with some organizations. This step confirmed the suitability and validity of our questionnaire.

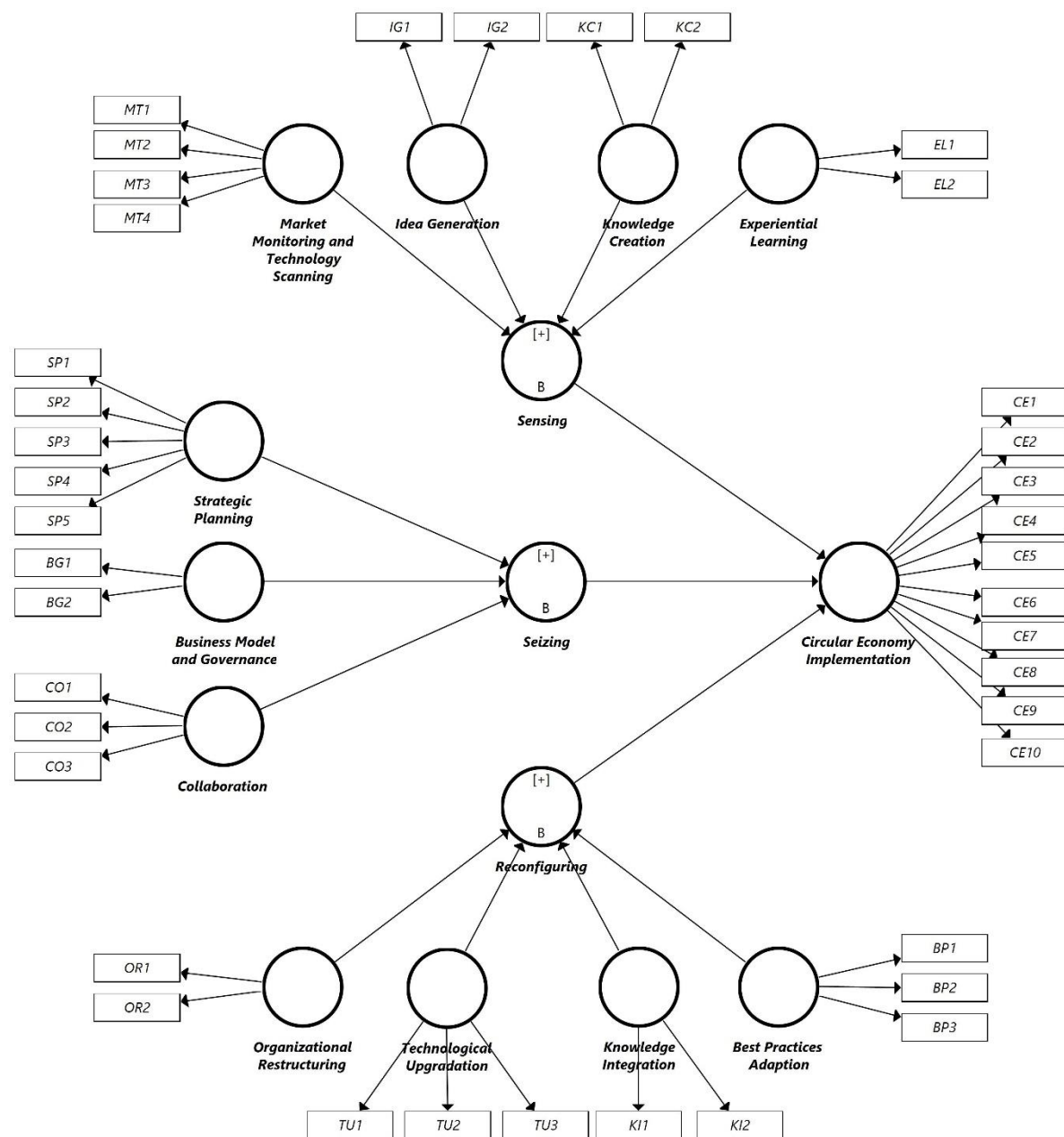
3.3.2. Constructs and Measures

The theory of dynamic capabilities emphasizes on how the resource base is established and/or adapted by the organizations facing a rapidly changing environment. Winter (2003) pointed out that this adaption of the resource base is based on organizational routines. Therefore, we operationalized sensing, seizing, and reconfiguring by their underlying organizational routines (microfoundations). We followed a recent study to construct sensing, seizing, and reconfiguring (O. Khan et al., 2020). Accordingly, we developed a hierarchical component model (HCM) based on first-order and second-order constructs as following (Sarstedt et al., 2019). We constructed sensing (*second-order construct*) with four microfoundations (*first-order constructs*), namely market monitoring and technology scanning (SEN-MT), idea generation (SEN-IG), knowledge creation (SEN-KC), and experiential learning (SEN-EL). We constructed seizing (*second-order construct*) with three microfoundations (*first-order constructs*), namely strategic planning (SEI-SP), business model and governance (SEI-BG), and collaboration (SEI-CO). We constructed reconfiguring (*second-order construct*) with four microfoundations (*first-order constructs*), namely organizational restructuring (REC-OR), technological upgradation (REC-TU), knowledge integration (REC-KI), and best practices adaption (REC-BP) (O. Khan et al., 2020).

To measure the constructs of sensing, seizing, and reconfiguring, we mainly developed indicators based on the insights from previous studies (O. Khan et al., 2020; Mousavi & Bossink, 2017; Teece, 2007) and adapted some indicators from other studies (Eurostat, 2014; Mousavi et al., 2018; Wilden & Gudergan, 2015; Wilden et al., 2013). For sensing, we asked organizations how frequently they engage in listed activities (see Table 3.2) to identify new opportunities in terms of new products on a Likert scale (1. *never*, 2. *rarely*, 3. *sometimes*, 4. *often*, 5. *regularly*). For seizing, we asked organizations to evaluate listed actions (see Table 3.2) that they might take once they have identified a new opportunity to produce new products on a Likert scale (1. *strongly disagree*, 2. *disagree*, 3. *undecided*, 4. *agree*, 5. *strongly agree*). For reconfiguring, we asked organizations to evaluate how well listed renewal actions (see Table 3.2) succeeded on a Likert scale (1. *poorly failed*, 2. *slightly succeeded*, 3. *fairly succeeded*, 4. *well succeeded*, 5. *perfectly succeeded*) to accomplish identified opportunities.

We operationalized CE implementation (*first-order construct*) by various CE practices. We considered all phases of CE, that is, design, production, consumption, collection, recycling, and resourcing since different organizations might have adopted different CE practices. To measure the construct of CE implementation, we partly developed indicators and partly adapted indicators from previous studies (Zhu, Geng, & Lai, 2010). We asked organizations whether they have been considering or implementing the listed CE practices (see Table 3.2) on a Likert scale (1. *not considering it*, 2. *planning to consider it*, 3. *considering it*, 4. *initiating implementation*, 5. *implementing successfully*) (Zhu et al., 2010). To operationalize the proposed HCM, we followed the recommended guidelines (Jarvis, MacKenzie, & Podsakoff, 2003). Simply put, we modeled first-order constructs as reflective measurement models and second-order constructs as formative measurement models commonly referred to as reflective-formative HCM (see Figure 3.2).

Figure 3.2: Hierarchical Measurement Model



3.3.3. Data Collection and Analysis

The Italian manufacturing sector has been putting efforts towards CE (Gusmerotti et al., 2019). Therefore, this sector seems suitable for testing our proposed hypotheses. We compiled a list of 2969 manufacturing organizations registered in the Italian Chamber of Commerce and Industry. Then, we extracted their email addresses through the ORBIS database. In June 2019, we sent email invitations to those organizations to participate in the present study. We explicitly requested organizations that the online survey should be completed by a top manager (CEO/Director/General Manager/Environmental Manager). We allowed only one respondent per organization to complete the online survey. We received data from 246 organizations through SurveyMonkey. However, to ensure the reliability of our dataset, we followed very strict criteria of data screening. That is, we deleted observations with more than 15% missing values, retaining 220 observations in our dataset for further analysis (Hair, Hult, Ringle, & Sarstedt, 2017).

The sample size of the present study satisfied the recommended rule of thumb, that is, ten times to the number of indicators of constructs in question (Hair, Sarstedt, Ringle, & Mena, 2012). Indeed, the sample size of the present study (220) is comparatively bigger than the average sample size of previous studies (155) who employed PLS-SEM in management studies (Hair, Sarstedt, Pieper, & Ringle, 2012). It is worth noting that the majority of organizations in our dataset are medium-sized organizations that have high annual income too (see Table 3.1). To analyze the collected data, we employed structural equation modeling (SEM) since it is regarded as a very robust and powerful statistical tool in various disciplines including management studies (Hair, Sarstedt, Pieper, et al., 2012). To conduct SEM, two main approaches are known as covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM). PLS-SEM is more suitable when the research is exploratory or predicting target constructs, the structural model is complex, and constructs are formatively measured (Hair, Ringle, & Sarstedt, 2011). Moreover, PLS-SEM is known to exhibit higher statistical power compared to CB-SEM in the case of HCM (Wetzels, Odekerken-Schröder, & Van Oppen, 2009). Hence, we chose PLS-SEM with SmartPLS 3 to test our proposed research model or HCM (Ringle, Wende, & Becker, 2015).

Table 3.1: Description of Sample

Variable	Description	Number of Organizations
Number of Employees	1 – 49	1
	50 – 249	109
	250 – 999	83
	1000 – 4999	24
	More than 5000	3
Annual Income	Less than 1,000,000 euro	23
	1,000,001 - 2,000,000 euro	11
	2,000,001 - 10,000,000 euro	16
	10,000,001 - 50,000,000 euro	81
	Higher than 50,000,000 euro	89
NACE Activities	Manufacture of food products	18
	Manufacture of beverages	5
	Manufacture of textiles	12
	Manufacture of wearing apparel	7
	Manufacture of leather and related products	8
	Manufacture of wood and of products of wood and cork	2
	Manufacture of paper and paper products	6
	Printing and reproduction of recorded media	3
	Manufacture of coke and refined petroleum products	1
	Printing and reproduction of recorded media	12
	Manufacture of basic pharmaceutical products and pharmaceutical preparations	7
	Manufacture of rubber and plastic products	11
	Manufacture of other non-metallic mineral products	8
	Manufacture of basic metals	11
	Manufacture of fabricated metal products, except machinery and equipment	24
	Manufacture of computer, electronic and optical products	12
	Manufacture of electrical equipment	12

Manufacture of machinery and equipment	23
Manufacture of motor vehicles, trailers and semi-trailers	10
Manufacture of other transport equipment	5
Manufacture of furniture	15
Other manufacturing	8

To measure proposed HCM, we employed the embedded two-stage approach (mode B) instead of the repeated indicators approach (Becker, Klein, & Wetzels, 2012). It is worth mentioning that the repeated indicators approach can be easily applied in PLS-SEM. However, the repeated indicators approach is a bit problematic in HCM (Sarstedt et al., 2019). Simply put, the R^2 value tends to be unity by default thus path coefficient also tends to be zero or nonsignificant. In contrast, the embedded two-stage approach shows better results for HCM (Ringle, Sarstedt, & Straub, 2012). Using the embedded two-stage approach, we applied the standard repeated indicators approach in the first stage. However, instead of interpreting model estimates, we saved the scores of all constructs and added them as new indicators in the dataset. In the second stage, we used that saved scores of constructs as indicators to measure the structural model (Sarstedt et al., 2019). Chin (2010) suggests that a two-step approach should be used to examine and interpret PLS-SEM. Accordingly, firstly, we assessed the measurement model with recommended settings by using the PLS algorithm at 300 iterations and bootstrapping with 5000 subsamples (Hair, Sarstedt, Ringle, et al., 2012). Secondly, we assessed the structural model and examined our proposed hypotheses. In short, the present study carefully followed the recommended rules and guidelines while conducting PLS-SEM analysis and reporting the results (Chin, 2010; Hair, Risher, Sarstedt, & Ringle, 2019; Sarstedt et al., 2019).

3.4. Results

3.4.1. Measurement Model

We followed four steps criteria, namely indicator reliability, internal consistency, convergent validity, and discriminant validity for evaluating reflective measurement models (Hair et al., 2019). According to Hair et al. (2011), indicator loadings should ideally be higher than 0.70. Nevertheless, indicator loadings between 0.40 and 0.70 are also acceptable if the average variance extracted (AVE) of the construct is higher than 0.50 (Hair, Sarstedt, Ringle, et al., 2012; Hulland, 1999). We found that all the indicator loadings are ranging between 0.635 and 0.934 thus the present study satisfied the criteria of indicator reliability (see Table 3.2). For internal consistency, the values of Cronbach's alpha (α) or composite reliability (CR) should ideally be higher than 0.70 (Hair et al., 2011). Even though both Cronbach's α and CR are measures of internal consistency, Hair et al. (2019) point out that Cronbach's α is a less precise measure thus CR should preferably be reported. We found that CR values of all the constructs

are ranging between 0.819 and 0.926 thus the present study satisfied the criteria of internal consistency (see Table 3.2). For convergent validity, the AVE of each construct should be higher than 0.50 (Hair et al., 2011). We found that AVE values of all the constructs are ranging between 0.502 and 0.862 (see Table 3.2). Thus, the present study satisfied the criteria of convergent validity.

Table 3.2: Results of Hierarchical Measurement Model

Second-Order Construct	First-Order Construct	Indicator Code	Indicator	Loadings ¹	CR ²	AVE ³
	Circular Economy Implementation (CE)	CE1	designing products to be easily repaired / refurbished	0.696	0.910	0.502
		CE2	designing products to be easily biodegradable / recyclable	0.734		
		CE3	utilizing biodegradable / recyclable packaging	0.732		
		CE4	using closed-loops in the production	0.725		
		CE5	increasing material and energy efficiency	0.765		
		CE6	transferring / selling bi-products to other organizations	0.635		
		CE7	providing repairing / refurbishing services to customers	0.744		
		CE8	collecting end-of-life products	0.688		
		CE9	recycling own production waste	0.684		
		CE10	reusing bi-products / recycled materials from other organizations	0.676		
Sensing VIF = 1.75	Market Monitoring and Technology Scanning (SEN-MT) Weights = 0.328 Sig. (t-value) = 18.637 VIF = 1.98	SEN-MT1	identification of customer needs	0.843	0.918	0.738
		SEN-MT2	tracking new market trends	0.900		
		SEN-MT3	analyzing competitors' actions	0.798		
		SEN-MT4	observing technological developments	0.890		
	Idea Generation (SEN-IG) Weights = 0.312 Sig. (t-value) = 18.311 VIF = 1.82	SEN-IG1	organizing brainstorming sessions	0.853	0.858	0.752
		SEN-IG2	involving customers / suppliers in product development process	0.882		
	Knowledge Creation (SEN-KC) Weights = 0.293 Sig. (t-value) = 18.248 VIF = 1.90	SEN-KC1	undertaking R&D to create new knowledge for developing new products / processes	0.923	0.926	0.862
		SEN-KC2	undertaking R&D to try out new ideas having strategic / operational implication	0.934		

Seizing VIF = 1.72	Experiential Learning (SEN-EL) Weights = 0.296 Sig. (t-value) = 18.228 VIF = 1.62	SEN-EL1	assessing potential environmental impacts of products / processes / services	0.873	0.876	0.780
		SEN-EL2	networking with public organizations / industrial associations / universities / others	0.893		
	Strategic Planning (SEI-SP) Weights = 0.427 Sig. (t-value) = 22.727 VIF = 1.80	SEI-SP1	formulation of a strategy	0.727	0.842	0.517
		SEI-SP2	finding strategic partners	0.735		
		SEI-SP3	planning investments	0.785		
		SEI-SP4	capital budgeting	0.690		
		SEI-SP5	planning requisite human resources	0.650		
	Business Model and Governance (SEI-BG) Weights = 0.386 Sig. (t-value) = 23.403 VIF = 1.46	SEI-BG1	redesigning / transforming business models	0.835	0.839	0.722
		SEI-BG2	restructuring of governance structure	0.864		
	Collaboration (SEI-CO) Weights = 0.403 Sig. (t-value) = 22.058 VIF = 1.51	SEI-CO1	collaboration to acquire requisite knowledge / skills	0.813	0.854	0.662
		SEI-CO2	collaboration to acquire requisite raw materials / resources	0.835		
		SEI-CO3	interdepartmental cooperation	0.792		
Reconfiguring VIF = 1.32	Organizational Restructuring (REC-OR) Weights = 0.277 Sig. (t-value) = 13.471 VIF = 1.37	REC-OR1	merger with or acquisition of another organization	0.836	0.819	0.693
		REC-OR2	changed organizational structure	0.830		
	Technological Upgradation (REC-TU) Weights = 0.322 Sig. (t-value) = 15.559 VIF = 1.81	REC-TU1	made slight modifications in existing technology / machinery	0.827	0.829	0.619
		REC-TU2	introduced new or significantly improved technology	0.835		
		REC-TU3	acquisition of a new manufacturing plant	0.690		
		REC-KI1	organized training to employees	0.841	0.823	0.699

**Knowledge Integration
(REC-KI)**

Weights = 0.313

Sig. (t-value) = 14.510

VIF = 1.69

Best Practices Adaption (REC-BP)	REC-BP1	adopted new business practices for organizing procedures	0.833	0.848	0.650
	REC-BP2	adopted new methods of organizing external relations	0.819		
	REC-BP3	adopted new or significantly improved logistics	0.765		

Weights = 0.343

Sig. (t-value) = 14.635

VIF = 1.85

Note:

1. Indicator Loadings > 0.5 indicates the indicator reliability (Hulland, 1999, p. 198)
2. Composite Reliability (CR) > 0.7 indicates the internal consistency of a set of indicators (Gefen, Straub, & Boudreau, 2000)
3. Average Variance Extracted (AVE) > 0.5 indicates the convergent reliability (Bagozzi & Yi, 1988)

There are two main approaches to assess discriminant validity: the Fornell-Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion (Henseler, Ringle, & Sarstedt, 2015). According to Chin (2010), in the Fornell-Larcker criterion, the square root of the AVE of each construct should be a greater value than its correlation with other constructs. We found that the measurement model satisfied the Fornell-Larcker criterion (see Table 3.3). Henseler et al. (2015) pointed out that in some circumstances the Fornell-Larcker criterion may not be effective to measure discriminant validity. Therefore, the HTMT criterion should be preferred instead of the Fornell-Larcker criterion (Ali, Rasoolimanesh, Sarstedt, Ringle, & Ryu, 2018). According to Hair et al. (2019), the HTMT value should be less than 0.90 for conceptually similar constructs. We found that the measurement model also satisfied the HTMT criterion (see Table 3.4). Thus, the present study satisfied the criteria of discriminant validity.

Table 3.3: Discriminant Validity (Fornell-Larcker Criterion)

	REC-BP	REC-KI	REC-OR	REC-TU	SEI-BG	SEI-CO	SEI-SP	SEN-EL	SEN-IG	SEN-KC	SEN-MT
REC-BP	0.806										
REC-KI	0.562	0.836									
REC-OR	0.449	0.438	0.833								
REC-TU	0.607	0.553	0.436	0.787							
SEI-BG	-0.299	-0.222	-0.135	-0.280	0.850						
SEI-CO	-0.338	-0.275	-0.216	-0.361	0.414	0.813					
SEI-SP	-0.301	-0.306	-0.204	-0.428	0.549	0.572	0.719				
SEN-EL	0.313	0.185	0.108	0.266	-0.358	-0.539	-0.330	0.883			
SEN-IG	0.423	0.302	0.230	0.312	-0.390	-0.500	-0.384	0.546	0.867		
SEN-KC	0.361	0.276	0.195	0.296	-0.292	-0.489	-0.358	0.528	0.518	0.928	
SEN-MT	0.358	0.302	0.251	0.402	-0.317	-0.524	-0.505	0.469	0.592	0.630	0.859

Note:

The diagonal values (in bold) are the square root of the AVEs of latent variables and indicates the highest in any column or row.

Table 3.4: Discriminant Validity (HTMT Criterion)

	REC-BP	REC-KI	REC-OR	REC-TU	SEI-BG	SEI-CO	SEI-SP	SEN-EL	SEN-IG	SEN-KC	SEN-MT
REC-BP	—										
REC-KI	0.870	—									
REC-OR	0.704	0.779	—								
REC-TU	0.841	0.871	0.707	—							
SEI-BG	0.448	0.374	0.229	0.425	—						
SEI-CO	0.460	0.423	0.335	0.506	0.602	—					
SEI-SP	0.402	0.461	0.316	0.581	0.797	0.757	—				
SEN-EL	0.434	0.287	0.173	0.383	0.536	0.733	0.440	—			
SEN-IG	0.602	0.482	0.374	0.448	0.604	0.705	0.530	0.784	—		
SEN-KC	0.458	0.402	0.286	0.385	0.405	0.618	0.444	0.676	0.681	—	
SEN-MT	0.448	0.422	0.356	0.503	0.425	0.641	0.615	0.578	0.766	0.725	—

Note:

HTMT < 0.90 is a threshold limit for conceptually similar constructs (Hair et al., 2019)

Next to the above-mentioned steps, we further assessed first-order constructs for their psychometric properties since these first-order constructs were modeled to act as formative indicators for second-order constructs. Simply put, we checked the significance and relevance of second-order weights through bootstrapping. We found that the significance of the outer weights of all indicators, that is, first-order constructs forming second-order constructs surpassed the critical threshold value ($t > 1.96$) (see Table 3.2). Finally, we checked the variance inflation factor (VIF) of constructs and indicators. We did not find any multicollinearity issue since VIF values of all constructs (see Table 3.2) were less than 3.0 (Hair et al., 2019). In short, the measurement model of the present study was proven to be appropriate. Thus, we proceeded to the structural model evaluation.

3.4.2. Structural Model

Firstly, we checked the R^2 value, which indicates in-sample predictive power, for the endogenous construct (CE). The R^2 value for CE was found to be 0.204 which confirmed that the estimations fit the data well. According to Cohen (1992), the R^2 values of 0.02, 0.13, and 0.26 are respectively considered as small, medium, and large. However, in some disciplines (or exploratory research), a lower R^2 value such as 0.10 could be considered as a satisfactory value (Hair et al., 2019). Therefore, the R^2 value of CE in the present study could be regarded as relatively high and acceptable. Next, we checked the predictive relevance through Stone-Geisser's Q^2 value by using the blindfolding technique with an omission distance of seven (Ringle et al., 2015). According to Hair et al. (2019), the Q^2 values greater than the values of 0, 0.25, and 0.50 respectively depict small, medium, and large predictive relevance. The Q^2 value of CE in the present study was found to be 0.143 which confirmed the predictive relevance of the structural model. Hair et al. (2017) suggest the model fit indices as $SRMR < 0.08$ and $NFI > 0.90$. We found SRMR and NFI values equal to 0.043 and 0.939 respectively. Thus, the present study satisfied the overall model fit criteria of PLS-SEM.

Finally, to test the proposed hypotheses, we computed the PLS algorithm and bootstrapping (Ringle et al., 2015). In other words, we calculated path coefficients (standardized beta), significance levels, and t-values to assess the relationships among constructs. We found that the direct effect of sensing on CE implementation has a significant value of 0.277 ($p < 0.01$). Thus, hypothesis 1 was found to be empirically supported (see Table 3.5). Furthermore, the direct effects of seizing and reconfiguring on CE implementation have significant values of 0.160 ($p < 0.05$) and 0.347 ($p < 0.01$) respectively. Thus, hypotheses 2 and 3 were found to be empirically supported (see Table 3.5).

Table 3.5: Hypothesis Testing (Bootstrapping Results)

Hypotheses	Relationships	Std Beta	Std Error	t Values	p Values	Findings	f ²	q ²	95% CI LL	95% CI UL
H1	Sensing → CE Implementation	0.277	0.081	3.427***	0.001	Supported	0.053	0.011	0.172	0.439
H2	Seizing → CE Implementation	0.160	0.078	2.049**	0.041	Supported	0.018	0.016	0.131	0.346
H3	Reconfiguring → CE Implementation	0.347	0.073	4.729***	0.000	Supported	0.116	0.104	0.236	0.477

Note:

** $p < 0.05$; *** $p < 0.01$;

The t Values around 1.65, 1.96, and 2.58 are considered with the significance level of 10%, 5% and 1%, respectively (Two-Tailed Test)

Effect Size (f^2) values according to Cohen (1988) are 0.35 (large), 0.15 (medium), and 0.02 (small)

Predictive Relevance (q^2) values according to Henseler, Ringle, and Sinkovics (2009) are 0.35 (large), 0.15 (medium), and 0.02 (small)

3.4.3. Importance-Performance Matrix Analysis (IPMA)

We employed Importance-Performance Matrix Analysis (IPMA) to identify the most important capabilities and organizational routines (microfoundations) for CE implementation. IPMA is known as a post hoc analysis that highlights the key spots for further improvement through managerial actions. In IPMA, the data of each latent construct is averaged and rescaled to calculate the performance values. IPMA plots the total effects (importance) at the x-axis and the average values of latent constructs scores (performance) at the y-axis. Thus, accordingly identifies predecessors that have relatively high importance for the target construct (Ringle & Sarstedt, 2016). It implies that one unit increase in the performance of the latent construct and/or indicator is expected to increase the performance of the target construct by the value of the corresponding total effect. The present study focused on latent constructs (sensing, seizing, and reconfiguring) and the target construct (CE implementation).

To perform IPMA, we followed the recommended guidelines (Ringle & Sarstedt, 2016). We ensured that all the scales in the present study were either metric or quasi-metric and had the same coding direction. Furthermore, we ensured that the outer weights of all the indicators were positive and there was no collinearity among the constructs and indicators. Overall, the IPMA results revealed that reconfiguring, in comparison with sensing and seizing, is the most important for CE implementation. However, the performance of sensing is slightly better in comparison with reconfiguring (see Table 3.6). Furthermore, IPMA revealed that market monitoring and technology scanning (SEN-MT), knowledge creation (SEN-KC), strategic planning (SEI-SP), collaboration (SEI-CO), technological upgradation (REC-TU), and best practices adaption (REC-BP) can be regarded as prominent microfoundations of sensing, seizing, and reconfiguring respectively.

To identify a CE opportunity, the most important organizational routines include tracking new market trends (SEN-MT2), observing technological developments (SEN-MT4), involving customers/suppliers in the product development process (SEN-IG2), undertaking R&D to try out new ideas (SEN-KC2), and assessment of potential environmental impacts of products/processes (SEN-EL1). However, in terms of performance, identification of customer needs (SEN-MT1) is slightly better compared to SEN-MT2. It is worth noting that R&D to create new knowledge for developing new products/processes (SEN-KC1) is much better than

SEN-KC2 in terms of performance. Interestingly, SEN-MT4, SEN-IG2, and SEN-EL1 hold their performance in line with their importance.

To address a newly identified CE opportunity, the most important organizational routines include planning investments (SEI-SP3), finding strategic partners (SEI-SP2), restructuring of governance structure (SEI-BG2), collaboration to acquire requisite materials (SEI-CO2). However, in terms of performance, planning human resources (SEI-SP5) and strategy formulation (SEI-SP1) are slightly better compared to SEI-SP2 and SEI-SP3. Similarly, the redesigning of business models (SEI-BG1) compared to SEI-BG2 and interdepartmental cooperation (SEI-CO3) compared to SEI-CO2 are slightly better. Finally, the most important reconfiguring actions include organizational structure changes (REC-OR2), new technology introduction (REC-TU2), training of employees (REC-KI1), and adoption of new business practices (REC-BP1). However, mergers or acquisitions (REC-OR1) compared to REC-OR2 and modifications in existing technology (REC-TU1) compared to REC-TU2 are slightly better. Interestingly, REC-KI1 and REC-BP1 hold their performance in line with their importance.

Table 3.6: Results of Importance-Performance Matrix Analysis

Second-Order Constructs	First-Order Constructs	Indicator Code	Indicators	Importance (Total Effects)	Performance (Index Values)
Sensing Importance: 0.238 Performance: 67.264	Market Monitoring and Technology Scanning (SEN-MT) Importance: 0.086 Performance: 80.735	SEN-MT1	identification of customer needs	0.022	82.045
		SEN-MT2	tracking new market trends	0.023	80.795
		SEN-MT3	analyzing competitors' actions	0.016	76.364
		SEN-MT4	observing technological developments	0.024	82.386
	Idea Generation (SEN-IG) Importance: 0.070 Performance: 57.289	SEN-IG1	organizing brainstorming sessions	0.032	55.795
		SEN-IG2	involving customers / suppliers in product development process	0.038	58.523
	Knowledge Creation (SEN-KC) Importance: 0.065 Performance: 72.760	SEN-KC1	undertaking R&D to create new knowledge for developing new products / processes	0.032	76.023
		SEN-KC2	undertaking R&D to try out new ideas having strategic / operational implication	0.033	69.659
	Experiential Learning (SEN-EL) Importance: 0.061 Performance: 53.690	SEN-EL1	assessing potential environmental impacts of products / processes / services	0.031	58.068
		SEN-EL2	networking with public organizations / industrial associations / universities / others	0.031	49.318
Seizing Importance: 0.138 Performance: 47.499	Strategic Planning (SEI-SP) Importance: 0.071 Performance: 45.946	SEI-SP1	formulation of a strategy	0.013	47.045
		SEI-SP2	finding strategic partners	0.015	45.341
		SEI-SP3	planning investments	0.016	42.273
		SEI-SP4	capital budgeting	0.013	41.477
		SEI-SP5	planning requisite human resources	0.013	54.545
	Business Model and Governance (SEI-BG) Importance: 0.055 Performance: 53.063	SEI-BG1	redesigning / transforming business models	0.026	54.318
		SEI-BG2	restructuring of governance structure	0.029	51.932
	Collaboration (SEI-CO) Importance: 0.057	SEI-CO1	collaboration to acquire requisite knowledge / skills	0.017	44.545
		SEI-CO2	collaboration to acquire requisite raw materials / resources	0.021	41.023

Reconfiguring Importance: 0.335 Performance: 64.411	Performance: 44.104	SEI-CO3	interdepartmental cooperation	0.020	46.932
	Organizational Restructuring (REC-OR)	REC-OR1	merger with or acquisition of another organization	0.056	64.318
	Importance: 0.113	REC-OR2	changed organizational structure	0.056	59.886
	Performance: 62.107				
	Technological Upgradation (REC-TU)	REC-TU1	made slight modifications in existing technology / machinery	0.051	69.205
	Importance: 0.139	REC-TU2	introduced new or significantly improved technology	0.051	67.386
	Performance: 68.328	REC-TU3	acquisition of a new manufacturing plant	0.036	68.409
	Knowledge Integration (REC-KI)	REC-KI1	organized training to employees	0.067	65.000
	Importance: 0.132	REC-KI2	acquisition of existing know-how	0.065	63.750
	Performance: 64.386				
	Best Practices Adaption (REC-BP)	REC-BP1	adopted new business practices for organizing procedures	0.050	62.614
	Importance: 0.143	REC-BP2	adopted new methods of organizing external relations	0.047	62.500
	Performance: 62.467	REC-BP3	adopted new or significantly improved logistics	0.046	62.273

3.5. Discussion and Implications

We focused on a research gap, that is, dynamic capabilities for CE (Prieto-Sandoval et al., 2019). In particular, we investigated whether or not sensing, seizing, and reconfiguring capabilities facilitate CE implementation. If they do so, which are the most important capabilities and organizational routines (microfoundations) that might facilitate organizations in identifying and accomplishing CE opportunities. Our PLS-SEM analysis shows that dynamic capabilities, that is, sensing, seizing, and reconfiguring, and their respective microfoundations significantly facilitate CE implementation. Mousavi et al. (2018) show that sensing capabilities play the most prominent role in sustainable innovation. In contrast, our results show that reconfiguring capabilities play the most prominent role in CE implementation compared to sensing and seizing capabilities (see Figure 3.3 and Figure 3.4).

Figure 3.3: Summary of Results (First Stage: Measurement Model)

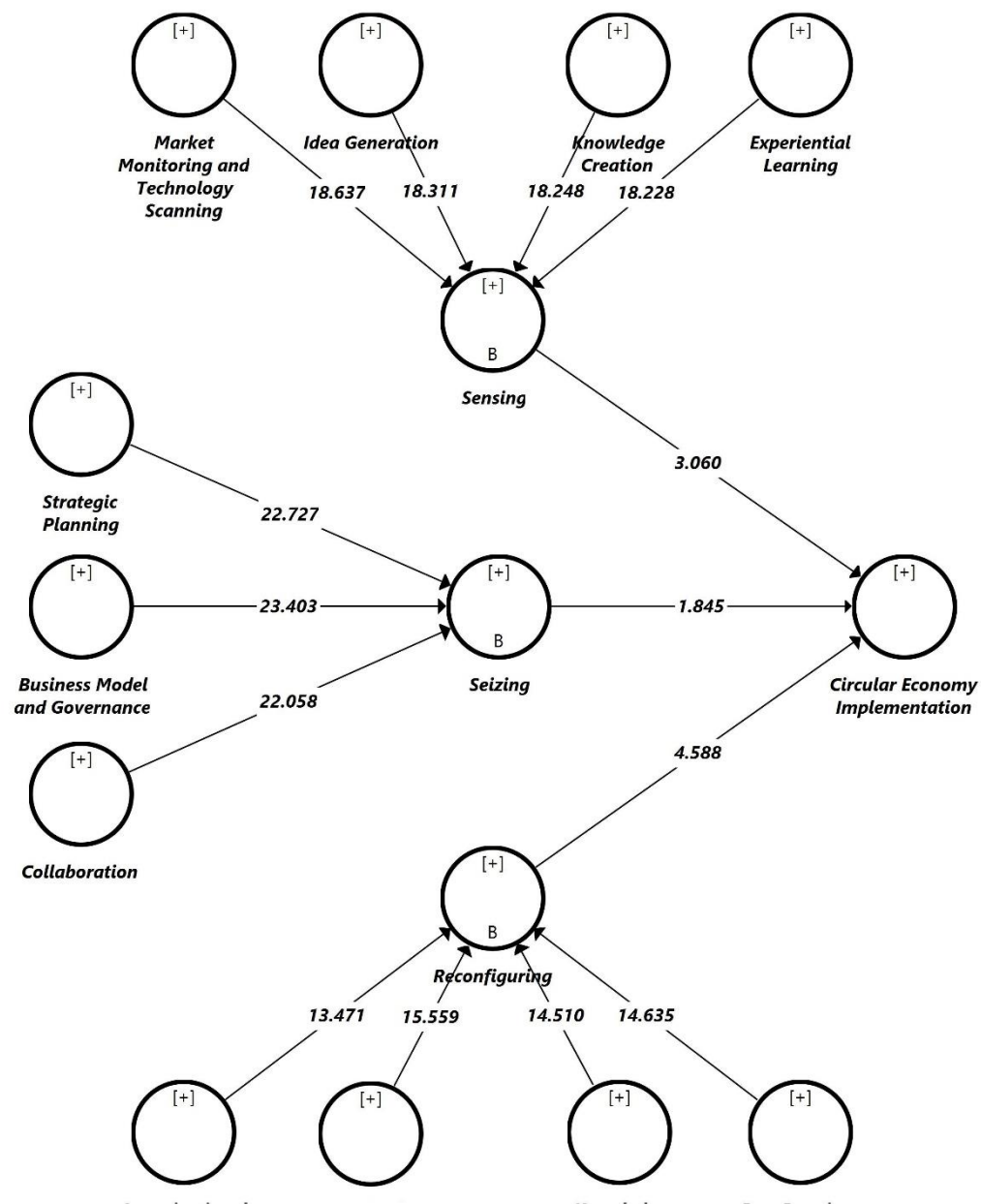
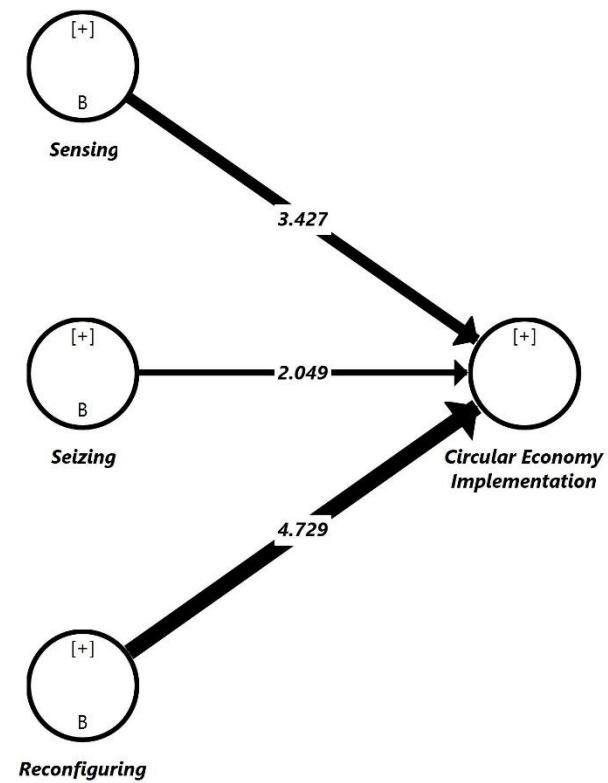


Figure 3.4: Summary of Results (Second Stage: Structural Model)



Previous studies substantiated that dynamic capabilities hold a vital role in attaining corporate sustainability (Annunziata et al., 2018; Strauss et al., 2017; Q. Wu et al., 2013). Nevertheless, Amui et al. (2017) pointed out that more studies should be conducted on dynamic capabilities for corporate sustainability. They believe that more research on dynamic capabilities will surely help organizations in tackling corporate sustainability challenges. Our results on the relationship between dynamic capabilities and CE not only corroborate the aforementioned studies but also guide organizations in dealing with emerging sustainability challenges. Our results show that dimensions of dynamic capabilities, sensing, seizing, and reconfiguring are not very isolated (Q. Wu et al., 2013), rather these dimensions represent a sequential process that organizations should follow to attain CE. In other words, at first, organizations would have to employ sensing capabilities in order to identify CE opportunities. Afterward, to accomplish that identified CE opportunities, organizations would have to employ seizing and reconfiguring capabilities. Our IPMA results highlight the most important microfoundations through which organizations might identify and accomplish CE opportunities (see Table 3.6).

Porter and Linde (1995) pointed out that failure to identify new and profitable opportunities is a significant barrier to eco-innovation. In this regard, our results suggest that a microfoundation of sensing, that is, assessment of potential environmental impacts of products, can eliminate that imperfect information barrier. It implies that organizations having capabilities or tools such as EMAS and LCA are more likely to accomplish eco-innovation or sustainable innovation (Daddi et al., 2011; Mousavi & Bossink, 2017). According to Amui et al. (2017), a capability can be referred to as a dynamic capability if that capability enhances an organization's ability to identify opportunities and threats, solve problems, make decisions, and modify resource base (Barreto, 2010). Therefore, we can say that LCA is a dynamic capability and an essential tool to identify a CE opportunity (O. Khan et al., 2020). It is worth mentioning that the role of LCA is already proven to be very effective at the micro-level to develop green products (Dangelico & Pujari, 2010) and sustainable innovations (Mousavi & Bossink, 2017), whereas at the meso-level in industrial symbiosis (Daddi et al., 2017). Hence, we explicitly suggest that organizations should adopt LCA for CE objectives (Niero & Rivera, 2018).

Our results show that conventional microfoundations of sensing (Teece, 2007), that is, identification of customer needs, tracking new market trends, analyzing competitors' actions, observing technological developments, involving customers or suppliers in the product

development process, and undertaking R&D, play a pivotal role in identifying new opportunities. Therefore, organizations aiming towards CE must incorporate these microfoundations into their day-to-day operations. Chakrabarty and Wang (2012) point out that organizations having R&D capability are more likely to develop and/or successfully maintain sustainability practices. Our results not only support the above-mentioned point but also indicate that R&D is an important dynamic capability to identify a CE opportunity. It is worth noting that R&D for eco-innovation often needs huge investment therefore most SMEs often hesitate or fail to adopt CE (Ormazabal et al., 2018). Furthermore, organizations need to create new knowledge, R&D for CE objectives, that could not always be developed within in-house R&D labs. In this regard, our results show that a microfoundation of seizing, that is, collaboration with other organizations or research institutes to acquire requisite knowledge and skills, is highly valuable and successful (De Marchi, 2012). Our results also indicate that organizations should organize brainstorming sessions and do networking with other organizations and/or stakeholders in order to identify CE opportunities.

Our results show that the elements of strategic planning, that is, formulation of a strategy, finding strategic partners, planning investments, capital budgeting, and planning human resources, hold an important role in pursuing an identified CE opportunity. It is understood that the aforementioned organizational routines usually involve risky decisions. However, in the case of CE, top-management might encounter paradoxical tensions (Daddi et al., 2019). Hence, such decisions often become more riskier and complicated. Nevertheless, Gusmerotti et al. (2019) point out that environmentally conscious top management are more likely to adopt CE. It implies that the role of top management in strategic planning and/or CE decisions is quite pivotal. In this regard, our results indirectly suggest that top management should have the ability of risk-taking and act as an eco-entrepreneur. It is worth mentioning that such risk-taking ability is already proven to be very effective in cleaner technology implementation (Bhupendra & Sangle, 2015). In short, organizations aiming towards CE must be competent in strategic planning and/or possess appropriate seizing capabilities.

Our results confirm that a fundamental dynamic capability to seize CE opportunities is redesigning business models (Pieroni et al., 2019). However, to operationalize a CE business model organizations would have to establish collaborations. Indeed, most organizations cannot accomplish a CE opportunity without having collaborations for requisite knowledge, skills, and recyclable materials. This statement is in line with other studies that noticed that tackling

environmental challenges essentially need collaborations (Hofmann et al., 2012). Our results suggest that organizations must have the capability to manage diverse collaborations. Agarwal and Helfat (2009) pointed out that the allocation of resources and planning investments are crucial strategic decisions for an organization's performance. They emphasize on investments not only in R&D but also in acquisitions. Our results show that reconfiguring capabilities such as mergers or acquisitions and gaining technological competencies play an important role in CE implementation. Our IPMA results imply that organizations can never accomplish CE opportunities without having appropriate reconfiguring capabilities.

Our results indicate some managerial and policy implications too. It is evident from our results that both LCA and R&D are important capabilities to identify a CE opportunity. Therefore, organizations seeking CE opportunities should incorporate LCA in their organizational routines. Organizations should either organize training on LCA for their employees or recruit LCA experts. To attain various sustainable development goals through CE implementation, the government should provide incentives to organizations for R&D and/or LCA. Our results indicate that the role of CEOs/board of directors/senior management is very crucial in seizing CE opportunities. Therefore, organizations aiming to adopt CE should restructure their governance or reorganize their organizational structure. Organizations must plan and allocate both financial and human resources as per their CE objectives. The government should try to stimulate organizations' CE commitments by providing tax breaks or other financial incentives.

3.6. Conclusion

The main objective of this paper was to empirically assess the role of dynamic capabilities in CE implementation. We found that CE implementation is significantly facilitated by sensing, seizing, and reconfiguring capabilities. Hence, we unequivocally suggest that organizations must develop and apply dynamic capabilities for CE objectives. Organizations should strive to increase sensing capacity, strengthen seizing capacity, and continuously improve reconfiguring capacity. Organizations may do so by incorporating the aforementioned organizational routines into their day-to-day operations and by taking appropriate measures as mentioned in the previous section.

This paper, besides its merits, has some limitations. We followed the recommended guidelines to ensure the quality of the data. However, social desirability bias which is commonly found in surveys could not be ruled out. In other words, the respondents' perceptions may not coincide with the objective and rational reality. We measured the level of CE implementation in organizations through their self-reported data. This paper is limited to the sample size of 220 organizations and the survey was conducted in Italy. Therefore, the findings of this paper may only be generalized to other countries with caution. Nevertheless, this paper suggests some opportunities for future research. For instance, a similar could be replicated in other countries (or contexts) to get more valuable insights. It might be interesting to analyze whether our proposed hypotheses (results) deviate in a different research setting. Future studies may also investigate whether or not the relationship between dynamic capabilities and CE implementation consequently improves the overall performance of organizations. Lastly, future studies may conduct a qualitative study (retrospective longitudinal) to investigate how dynamic capabilities lead to CE implementation.

CHAPTER 4

The Role of Circular Dynamic Environment and Dynamic Capabilities in Circular Economy Implementation and Performance of Organizations: Evidence from the Manufacturing Sector

Redrafted from:

Khan, O., Daddi, T., & Iraldo, F. (2020). **The role of dynamic capabilities in circular economy implementation and performance of companies.** *Corporate Social Responsibility and Environmental Management*, 1–16. <https://doi.org/10.1002/csr.2020>

4.1. Introduction

Circular economy (CE) has been seriously discussed by scholars and practitioners (Merli et al., 2018). They believe that CE is vital for sustainable development (Ghisellini et al., 2016). Notably, the Ellen MacArthur Foundation (2013) points out that CE, being a straightforward strategy for corporate sustainability (Murray et al., 2017), can ultimately overcome global sustainability challenges by improving resource productivity. Hence, the EU and several national governments have been engaging organizations for CE implementation (Korhonen et al., 2018). However, most organizations perceive that they cannot transform their business operations, which are predominantly based on a linear economy, into a CE business model due to various barriers (Ormazabal et al., 2018). In contrast, some scholars perceive that organizations may do so by developing dynamic capabilities (DCs) (Kabongo & Boiral, 2017; O. Khan et al., 2020).

Teece et al. (1997) define DCs as *“the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing [dynamic] environment”* (p. 516). They argue that DCs are processes and/or activities through which an organization reconfigures its strategy and resources in order to accomplish a sustainable competitive advantage. Scholars and practitioners often remark that CE can provide a sustainable competitive advantage to organizations. For instance, van der Heijden (2018) remarked that *“companies that can do more with less have a massive competitive advantage over those that have to scabble around for expensive resources — and pay for their own pollution”*. However, the transition towards a CE is not so simple rather a complex process that demands an organizational change (Ritzén & Sandström, 2017). Mousavi et al. (2018) argue that the ability and willingness of an organization to implement an organizational change are dependent on its DCs. Hence, DCs are crucial for achieving CE (O. Khan et al., 2020).

The theory of dynamic capabilities (DCV) has been increasingly employed in the corporate sustainability studies (Annunziata et al., 2018; Hofmann et al., 2012; Q. Wu et al., 2013). Somewhat surprisingly, DCV is still underused in environmental management studies (Daddi et al., 2018). To date, only a few studies have employed DCV in the CE context (Kabongo & Boiral, 2017; O. Khan et al., 2020; Scarpellini, Valero-Gil, et al., 2020). Although Kabongo and Boiral (2017) and O. Khan et al. (2020) show that DCs may facilitate CE implementation, insights of these case studies may not be generalized. Hence, the role of DCs

for CE implementation needs to be further explored and thoroughly tested. Scholars argue that DCs involves substantial costs (Winter, 2003) thus organizations would be hesitant to use DCs without having any compelling reason or knowing potential benefits (Wilden et al., 2013). Here, we assume that organizations might not be interested in developing DCs for CE objectives unless they are sure that this would consequently improve their overall performance (Gusmerotti et al., 2019). However, to the best of our knowledge, the relationship between CE implementation and the overall performance of organizations is not yet thoroughly tested.

To contribute to this knowledge gap, we investigate whether or not DCs and their underlying organizational activities facilitate CE implementation. If so, to what extent DCs and CE implementation improve the overall performance of organizations. Furthermore, we assess whether or not a circular dynamic environment (CDE) influences CE implementation. This paper contributes to the literature of both DCV and CE in the following manner. Firstly, this paper empirically assesses the role of DCs in CE implementation using the partial least squares structural equation modeling (PLS-SEM). Accordingly, this paper highlights how organizations can identify and pursue CE opportunities. Secondly, this paper responds to the research calls that demand more research on DCs for CE (Prieto-Sandoval et al., 2019) and corporate sustainability (Amui et al., 2017). Thirdly, this paper investigates interrelationships of CDE and CE implementation along with DCs and the overall performance of organizations. Thus, this paper simultaneously contributes to both ongoing debates in DCV research: (1) how DCs leads to improved performance, and (2) what is the role of a dynamic environment. Fourthly, this paper presents the measurement scales and shows the operationalization of DCs as a hierarchical component model (HCM) in PLS-SEM (Sarstedt et al., 2019).

The rest of the paper proceeds as follows. Section 4.2 presents the theoretical framework and accordingly formulates the hypotheses. Section 4.3 describes how the constructs are operationalized, data is collected, and hypotheses are tested. Section 4.4 presents the results, whereas section 4.5 discusses these results and underlying implications. Finally, section 4.6 concludes the discussion, highlights the limitations, and suggests some future research opportunities.

4.2. Theoretical Framework and Hypotheses

DCs generate new knowledge, products, and processes that provide competitive advantages (Helfat et al., 2007). Scholars argue that DCs are an aggregation of organizational routines or activities (Winter, 2003) through which organizations attain new resource configurations (Eisenhardt & Martin, 2000). Teece (2007) explicated that DCs can be classified into three dimensions as “(1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the firm’s intangible and tangible assets” (p. 1319). These dimensions are generally known as “sensing”, “seizing”, and “reconfiguring”. DCs are undergirded by “microfoundations”, that is, “distinct skills, processes, and organizational activities” (Teece, 2007).

Hart (1995) pointed out that organizations may encounter various unexpected challenges during their transition to corporate sustainability. Many scholars have substantiated the above statement. For instance, Ormazabal et al. (2018) found that organizations are failing to adopt CE due to various barriers. Nevertheless, some scholars argue that both corporate sustainability and CE demand an organizational change (Ritzén & Sandström, 2017; Strauss et al., 2017). Hence, DCs are crucial for achieving both corporate sustainability and CE (Annunziata et al., 2018; O. Khan et al., 2020; Scarpellini, Marín-Vinuesa, et al., 2020). Put differently, DCs of an organization determine its ability and willingness to implement the required changes for corporate sustainability (Mousavi et al., 2018). Scholars widely acknowledge that DCs are patterned activities that systematically solve problems (Amui et al., 2017). Wu et al. (2013) pointed out that “*whether firms can overcome sustainability challenges lies in the development and application of their dynamic capabilities*” (p. 257). Few scholars have recently substantiated the above statement (Kabongo & Boiral, 2017; O. Khan et al., 2020; Mousavi & Bossink, 2017).

O. Khan et al. (2020) pointed out that “sensing”, “seizing”, and “reconfiguring” can be referred to as a sequential process through which organizations identify and pursue CE opportunities. They explicated that sensing is a set of activities that aim to identify new opportunities by scanning, learning, and interpretation. These activities usually involve knowing customer needs, analyzing market trends and competitors’ actions, interpreting suppliers’ feedback, and doing research and development (R&D) (Teece, 2007). We assume that those organizations that have appropriate sensing capabilities are more likely to successfully identify CE opportunities. O. Khan et al. (2020) explicated that seizing is a set of

activities, which usually involve planning and mobilization of resources, that aim to implement newly identified opportunities. They further explicated that reconfiguring is the ability of an organization to reconfigure new resources, and/or to recombine its existing resource base (Helfat et al., 2007), in order to accomplish a newly identified opportunity (O. Khan et al., 2020). We assume that those organizations that have appropriate seizing and reconfiguring capabilities are more likely to accomplish CE opportunities.

Even though corporate sustainability demands internalizing environmental and social concerns into business models which increase dynamism and add complexity (Arend, 2014), DCs are highly valuable in dealing with such complexities (Eikelenboom & de Jong, 2019). Indeed, scholars have a broad consensus on the significance of DCs for corporate sustainability (Amui et al., 2017). Prieto-Sandoval et al. (2019) used DCV to explore proactive environmental strategies for CE. They pointed out some DCs for CE implementation. Scarpellini, Valero-Gil, et al. (2020) investigated the cause-and-effect relationship between environmental capabilities and circular eco-innovation. They found a positive relationship between environmental capabilities and circular eco-innovation. Arend (2014) found a positive relationship between DCs and green activities. Some scholars have recently highlighted DCs as determinants or facilitators of CE. For instance, Kabongo and Boiral (2017) and O. Khan et al. (2020) show that DCs facilitate CE implementation. Hence, we may assume that there is a positive relation between DCs and CE implementation.

Scholars point out that a dynamic environment is an important contextual variable for DCV research. Dess and Beard (1984) referred a dynamic environment as “*an external environment of a company where changes cannot be easily predicted*”, whereas Wijnbenga and van Witteloostuijn (2007) referred this concept as “*the speed at which the preferences of customers and products or services of a company change*”. A dynamic environment can be interpreted as the pace of changes and innovations in the industry and the unpredictability of customers’ or competitors’ actions. Scholars highlight that a dynamic environment forces an organization to develop better DCs, which creates new or specific knowledge and nurtures creative thinking leading to innovativeness (Petrus, 2019). That is, DCs directly fight against a dynamic environment (Teece et al., 1997). Put differently, a dynamic environment drives an organization to cultivate DCs (Li & Liu, 2014).

In the CE context, we argue that CDE is a driving force of both DCs and CE. We define CDE “as a momentum, that is, a push by customers, governments, and competitive intensity, towards CE”. Scholars highlight that disruptive events such as drastic market change or the introduction of a radically new technology may stimulate organizations to develop and apply DCs in order to innovate circular products (Scarpellini, Valero-Gil, et al., 2020). Wilden et al. (2013) pointed out that an organization may not require or put to use DCs unless that organization faces some degree of competitive intensity. Some scholars argue that stakeholders’ pressures positively affects the adoption of CE business models (Prieto-Sandoval et al., 2019). Scarpellini, Marín-Vinuesa, et al. (2020) found that stakeholders’ pressures directly affect the environmental capabilities for CE. Furthermore, such environmental capabilities mediate the relationship between stakeholders’ pressures and the circular scope of an organization. Thus, we may hypothesize that DCs mediate the relation between CDE and CE implementation. We argue that the effects of DCs on CE implementation might be enhanced when an organization would be facing an intense CDE. In light of the above discussion, we propose our first, second, and third hypotheses as following (see Figure 4.1):

H1: Circular dynamic environment (CDE) is positively related to circular economy implementation level (CE)

H2: Dynamic capabilities (DCs) are positively related to circular economy implementation level (CE)

H3: The relation between circular dynamic environment (CDE) and circular economy implementation level (CE) is mediated by dynamic capabilities (DCs)

Scholars have been hotly debating on whether and how DCs lead to competitive advantage or improved performance. Teece et al. (1997) assumed that DCs directly impact the performance of an organization. Eisenhardt and Martin (2000) reckoned that DCs do not necessarily lead to improved performance. They pointed out that competitive advantage or improved performance does not rely on DCs themselves, rather on the resource configurations created by DCs. Wilden et al. (2013) found that DCs alone does not lead to superior performance; the ability of an organization to attain superior performance is contingent on a dynamic environment. That is, the context within which DCs are deployed affects performance. Schilke (2014) shows that a dynamic environment moderates the relation between DCs and

competitive advantage. Also, Wilden et al. (2013) show that competitive intensity moderates the relation between DCs and performance. We expect that CDE positively moderates the relation between DCs and the performance of organizations. Although some scholars found negative or insignificant effects (Protogerou, Caloghirou, & Lioukas, 2012; Wilden et al., 2013), most scholars generally agree that DCs positively affect the performance of organizations (Drnevich & Kriauciunas, 2011; Pezeshkan, Fainshmidt, Nair, Lance Frazier, & Markowski, 2016).

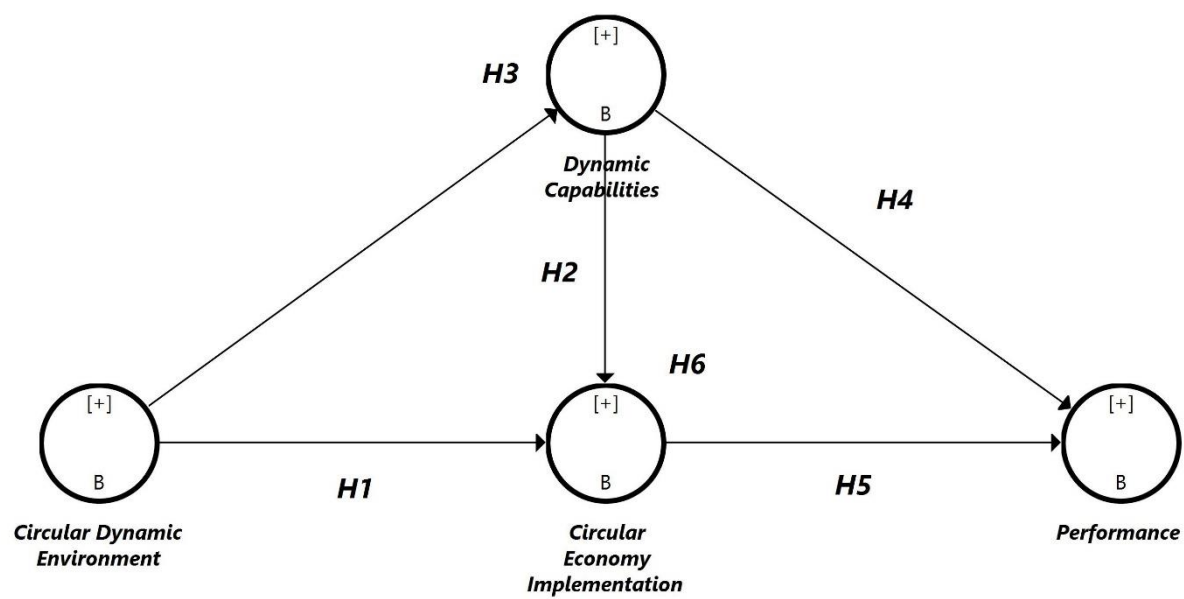
There are plentiful empirical studies on the relation between DCs and performance. However, research on mediating mechanisms of DCs effects is very scarce (Zhou et al., 2019). Wilden et al. (2013) suggest incorporating mediating mechanisms into the relation between DCs and performance. Zhou et al. (2019) hypothesized a mediating role of innovation between DCs and financial performance. They concluded that DCs facilitate different types of innovation that in turn improve the financial performance of an organization. Scholars generally acknowledge that CE activities lead to the improved environmental or financial performance of organizations (Scarpellini, Marín-Vinuesa, et al., 2020). Notably, Zhu et al. (2010) contended that CE practices are positively related to the environmental and financial performance of an organization. Thus, we may assume that there is a positive relation between CE implementation and the overall performance of organizations. Furthermore, we hypothesize that CE acts as a mediator that determines the relation and stipulates the extent to which DCs influence on the overall performance of an organization. In light of the above discussion, we propose our fourth, fifth, and sixth hypotheses as following (see Figure 4.1):

H4: Dynamic capabilities (DCs) are positively related to overall performance (PER) of an organization

H5: Circular economy implementation level (CE) is positively related to overall performance (PER) of an organization

H6: The relation between dynamic capabilities (DCs) and overall performance (PER) of an organization is mediated by circular economy implementation level (CE)

Figure 4.1: Research Model (Hypotheses)



4.3. Methodology

4.3.1. Questionnaire Development

We followed the recommended guidelines to develop the questionnaire (Churchill, 1979). Firstly, we reviewed relevant literature to identify indicators related to the constructs in question. Preferably, we gathered indicators from empirical studies wherever it was possible. Otherwise, we created new indicators based on conceptual studies. Next, we drafted a trial questionnaire with selected indicators. Four academicians and practitioners carefully assessed the trial questionnaire which led to refinement of indicators wording and reduction of the numbers of indicators. Then, we translated the questionnaire from English to Italian. We assumed that questionnaire in a native language may increase the response rate. Finally, we preliminary tested our questionnaire with some organizations. The obtained data satisfied the psychometric properties described in section 4.4.1. That is, the aforementioned step confirmed the suitability and validity of our questionnaire.

4.3.2. Constructs and Measures

We proposed a hierarchical component model (HCM) based on first-order and second-order constructs (Sarstedt et al., 2019). That is, we operationalized the main constructs of the present study with respective sub-constructs. We constructed circular dynamic environment (CDE) as a second-order construct with three first-order constructs namely, market turbulence (CDE-MT), technology turbulence (CDE-TT), and competitive intensity (CDE-CI). To measure the construct of CDE, we adapted indicators from previous studies (Carter & Carter, 1998; Jaworski & Kohli, 1993; Narver, Slater, & MacLachlan, 2004). In the questionnaire, we asked organizations to evaluate CDE indicators (see Table 4.2) on a Likert scale (*1. strongly disagree, 2. disagree, 3. undecided, 4. agree, 5. strongly agree*).

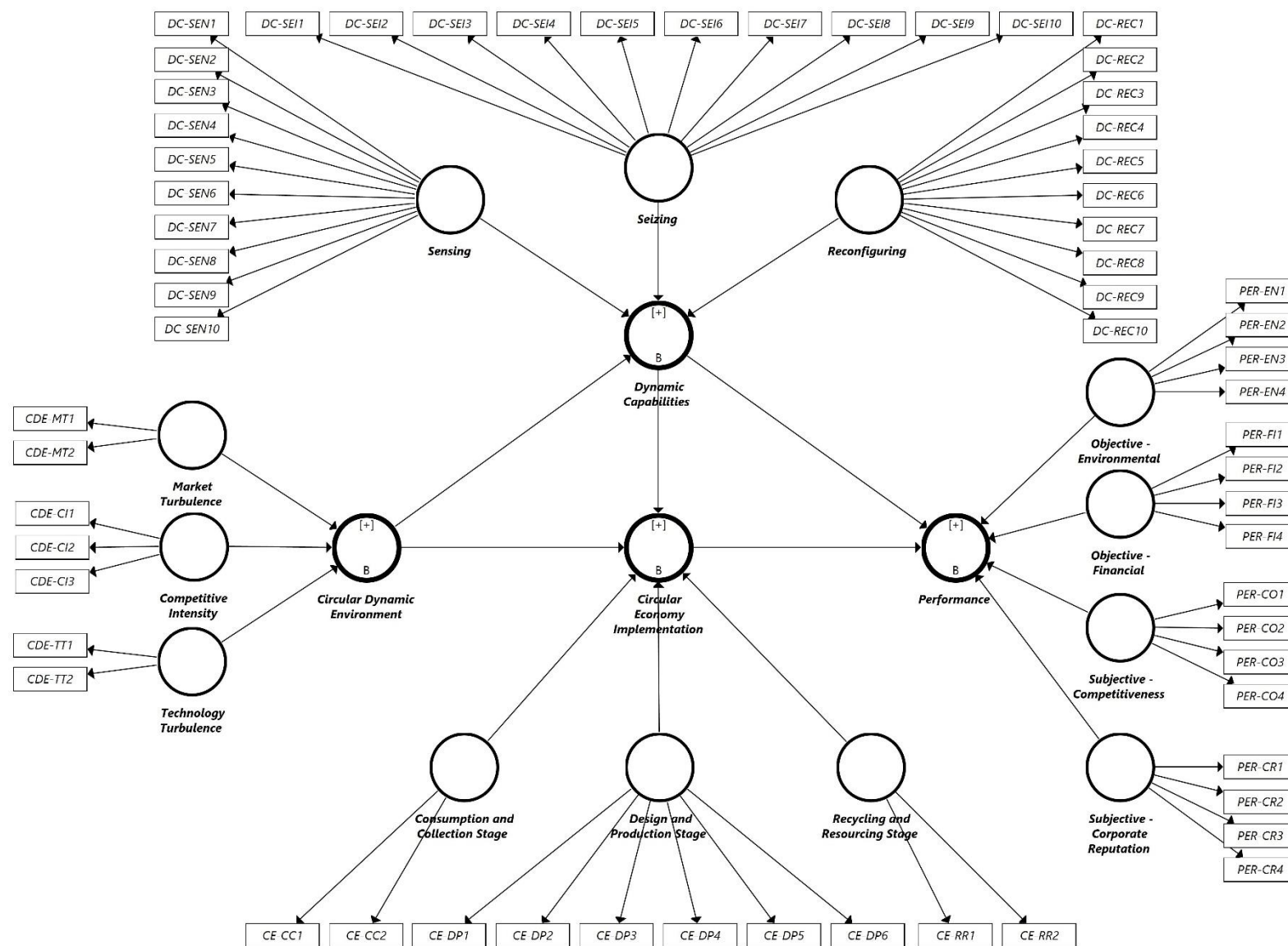
We constructed circular economy implementation level (CE) as a second-order construct with three first-order constructs namely, design and production (CE-DP), consumption and collection (CE-CC), and recycling and resourcing (CE-RR). Although the design, production, consumption, collection, recycling, and resourcing are distinct phases of the CE cycle, we combined adjacent phases for two reasons. First, to maintain the uniformity of our proposed HCM. Second, to avoid first-order constructs having only one indicator. We considered all phases of CE since different organizations may have adopted different CE practices. To measure the construct of CE, we partly developed indicators and partly adapted

from previous studies (Zhu et al., 2010). We asked organizations whether they have been considering or implementing the listed CE practices (see Table 4.3) on a Likert scale (1. *not considering it*, 2. *planning to consider it*, 3. *considering it*, 4. *initiating implementation*, 5. *implementing successfully*) (Zhu et al., 2010).

We constructed dynamic capabilities (DCs) as a second-order construct with three first-order constructs namely, sensing (DC-SEN), seizing (DC-SEI), and reconfiguring (DC-REC). We mainly operationalized the constructs of DC-SEN, DC-SEI, and DC-REC by respective organizational activities (Winter, 2003). To measure the construct of DCs, we explored a large number of organizational activities pertinent to DC-SEN, DC-SEI, and DC-REC. We mainly developed indicators based on the insights from previous studies (O. Khan et al., 2020; Mousavi & Bossink, 2017; Teece, 2007) and adapted some indicators from other studies (Eurostat, 2014; Mousavi et al., 2018; Wilden & Gudergan, 2015; Wilden et al., 2013). For DC-SEN, we asked organizations how frequently they engage in listed activities (see Table 4.4) to identify new opportunities in terms of new products or services on a Likert scale (1. *never*, 2. *rarely*, 3. *sometimes*, 4. *often*, 5. *regularly*). For DC-SEI, we asked organizations to evaluate listed actions (see Table 4.4) that they might take once they have identified a new opportunity to produce new products or to deliver new services (1. *strongly disagree*, 2. *disagree*, 3. *undecided*, 4. *agree*, 5. *strongly agree*). For DC-REC, we asked organizations to evaluate how well listed renewal actions (see Table 4.4) succeeded on a Likert scale (1. *poorly failed*, 2. *slightly succeeded*, 3. *fairly succeeded*, 4. *well succeeded*, 5. *perfectly succeeded*) to accomplish identified opportunities.

We constructed overall performance (PER) as a second-order construct with four first-order constructs namely, environmental performance (PER-EN), financial performance (PER-FI), competitiveness (PER-CO), and corporate reputation (PER-CR). To measure the construct of PER, we mainly adapted indicators from previous studies (Bagur-Femenias, Llach, & del Mar Alonso-Almeida, 2013; Eurostat, 2014; Zhu et al., 2010). In connection to their CE initiatives, we asked organizations to evaluate the improvement level (in last five years) of listed indicators (see Table 4.5) on a Likert scale (1. *not at all*, 2. *a little bit*, 3. *to some degree*, 4. *relatively significant*, 5. *significant*). To operationalize the aforementioned constructs, we followed the recommended guidelines (Jarvis et al., 2003). In short, we modeled first-order (*thinner circles*) and second-order (*thicker circles*) constructs respectively as reflective and formative measurement models commonly referred to as reflective-formative HCM (see Figure 4.2).

Figure 4.2: Hierarchical Measurement Model



4.3.3. Data Collection and Analysis

Italy is one of the largest economies in the world. The Italian manufacturing sector (second largest in the EU) is comprised of those industries (e.g. pulp and paper, leather, and textiles) that account for significant environmental impacts. Nevertheless, this sector has been putting efforts towards CE (Gusmerotti et al., 2019). Thus, this sector seems suitable for testing our proposed hypotheses. We compiled a list of 2969 manufacturing organizations registered in the Italian Chamber of Commerce and Industry. Then, we extracted their email addresses through the ORBIS database. In June 2019, we sent email invitations to those organizations to participate in our online survey. We received data from 246 organizations through SurveyMonkey. However, to ensure the reliability of our dataset, we followed very strict criteria of data screening. That is, we deleted observations with more than 15% missing values, retaining 220 observations in our dataset for further analysis (Hair et al., 2017). The sample size of the present study comfortably meets the recommended rule of thumb, that is, ten times to the number of indicators of the construct with the highest number of indicators (Hair, Sarstedt, Ringle, et al., 2012). Interestingly, the sample size of the present study is relatively high compared to the average sample size of previous studies who used PLS-SEM (Hair, Sarstedt, Pieper, et al., 2012). It is worth noting that the majority of organizations in our dataset are medium-sized organizations that have high annual income too (see Table 4.1).

Table 4.1: Description of Sample

Variable	Description	Number of Organizations
Number of Employees	1 - 49	1
	50 - 249	109
	250 - 999	83
	1000 - 4999	24
	More than 5000	3
Annual Income	Less than 1,000,000 euro	23
	1,000,001 - 2,000,000 euro	11
	2,000,001 - 10,000,000 euro	16
	10,000,001 - 50,000,000 euro	81
	Higher than 50,000,000 euro	89
NACE Activities	Manufacture of food products	18
	Manufacture of beverages	5
	Manufacture of textiles	12
	Manufacture of wearing apparel	7
	Manufacture of leather and related products	8
	Manufacture of wood and of products of wood and cork	2
	Manufacture of paper and paper products	6
	Printing and reproduction of recorded media	3
	Manufacture of coke and refined petroleum products	1
	Printing and reproduction of recorded media	12
	Manufacture of basic pharmaceutical products and pharmaceutical preparations	7
	Manufacture of rubber and plastic products	11
	Manufacture of other non-metallic mineral products	8
	Manufacture of basic metals	11
	Manufacture of fabricated metal products, except machinery and equipment	24
	Manufacture of computer, electronic and optical products	12
	Manufacture of electrical equipment	12

Manufacture of machinery and equipment	23
Manufacture of motor vehicles, trailers and semi-trailers	10
Manufacture of other transport equipment	5
Manufacture of furniture	15
Other manufacturing	8

To analyze our dataset, we employed structural equation modeling (SEM) since it is regarded as a very robust and powerful statistical tool in various disciplines (Hair, Sarstedt, Pieper, et al., 2012). To conduct SEM, two main approaches are known as covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM). PLS-SEM is recommended when the research is exploratory, the focus is on predicting target constructs, the structural model is complex, and constructs are formatively measured (Hair et al., 2011). For these reasons, we opted for PLS-SEM and used SmartPLS 3 software (Ringle et al., 2015). To measure our proposed HCM, we employed the embedded two-stage approach (mode B) instead of the repeated indicators approach (Becker et al., 2012). Although the repeated indicator approach can be easily applied in PLS-SEM, this approach is troublesome in HCM when reflective-formative or formative-formative constructs serve as dependent constructs in the structural model (Sarstedt et al., 2019). Simply put, the R^2 value becomes unity by default thus path coefficient tends to zero or nonsignificant. In contrast, the two-stage approach shows better results (Ringle et al., 2012). Chin (2010) recommends a two-step approach to examine and interpret PLS-SEM. Accordingly, firstly, we assessed the measurement model. For that, we applied the recommended settings by using a PLS algorithm with 300 iterations. Secondly, we assessed the structural model to examine our proposed hypotheses by using bootstrapping with 5000 subsamples (Hair, Sarstedt, Ringle, et al., 2012). We carefully followed the recommended rules and guidelines while conducting PLS-SEM analysis and reporting the results (Chin, 2010; Hair et al., 2019; Sarstedt et al., 2019).

4.4. Results

4.4.1. Measurement Model

First, we evaluated the reflective measurement model. For that, we assessed indicator reliability, internal consistency, convergent validity, and discriminant validity (Hair et al., 2019). According to Hair et al. (2011), indicator loadings should ideally be higher than 0.70. Nevertheless, indicator loadings between 0.40 and 0.70 are also acceptable if the average variance extracted (AVE) of the constructs is higher than 0.50 (Hair, Sarstedt, Ringle, et al., 2012). We found that all the indicator loadings were ranging between 0.617 and 0.932 (see Tables 4.2, 4.3, 4.4, and 4.5). Thus, the present study meets the criteria of indicator reliability.

For internal consistency, Cronbach's alpha (α) or composite reliability (CR) values should ideally be higher than 0.70 (Ali et al., 2018; Hair et al., 2011). Even though both Cronbach's α and CR are measures of internal consistency, Hair et al. (2019) point out that Cronbach's α is a less precise measure. Hence, CR should be preferably reported. We found that CR values were above the recommended cut-off values. That is, CR values were ranging between 0.874 and 0.939 (see Tables 4.2, 4.3, 4.4, and 4.5). Thus, we may conclude that the present study meets the criteria of internal consistency. For convergent validity, the AVE of each construct should be higher than 0.50 (Hair et al., 2011). We found that AVE values of all the constructs were ranging between 0.536 and 0.863 (see Tables 4.2, 4.3, 4.4 and 4.5). Thus, the present study meets the criteria of convergent validity.

Table 4.2: Results of Hierarchical Measurement Model (CDE)

Second-Order Constructs	First-Order Constructs	Indicator Code	Indicators	Loadings	CR	AVE
Circular Dynamic Environment (CDE) VIF = 1.392	Market Turbulence (CDE-MT) Weights = 0.413 t-value = 17.636 VIF = 1.729	CDE-MT1	customers are receptive to circular product ideas	0.926	0.926	0.863
		CDE-MT2	customers expect circular economy initiatives in the industry	0.932		
	Technology Turbulence (CDE-TT) Weights = 0.429 t-value = 15.260 VIF = 2.166	CDE-TT1	technological developments provide big opportunities for circular economy	0.904	0.895	0.810
		CDE-TT2	many circular product ideas have been made possible through technological breakthroughs	0.896		
	Competitive Intensity (CDE-CI) Weights = 0.316 t-value = 11.076 VIF = 1.874	CDE-CI1	competition on circular ideas is intense in the industry	0.847	0.884	0.719
		CDE-CI2	competitors have introduced circular products/services	0.906		
		CDE-CI3	public organizations expect circular economy initiatives	0.787		

Table 4.3: Results of Hierarchical Measurement Model (CE)

Second-Order Constructs	First-Order Constructs	Indicator Code	Indicators	Loadings	CR	AVE
Circular Economy Implementation Level (CE) VIF = 1.271	Design and Production Stage (CE-DP) Weights = 0.461 t-value = 14.141 VIF = 2.297	CE-DP1	designing products to be easily repaired / refurbished	0.680	0.881	0.554
		CE-DP2	designing products to be easily biodegradable / recyclable	0.768		
		CE-DP3	utilizing biodegradable / recyclable packaging	0.785		
		CE-DP4	using closed-loops in the production	0.752		
		CE-DP5	increasing material and energy efficiency	0.804		
		CE-DP6	transferring / selling bi-products to other organizations	0.666		
	Consumption and Collection Stage (CE-CC) Weights = 0.305 t-value = 8.933 VIF = 2.023	CE-CC1	providing repairing / refurbishing services to customers	0.883	0.874	0.776
		CE-CC2	collecting end-of-life products	0.879		
	Recycling and Resourcing Stage (CE-RR) Weights = 0.374 t-value = 13.278 VIF = 1.869	CE-RR1	recycling own production waste	0.877	0.876	0.779
		CE-RR2	reusing bi-products/recycled materials from other organizations	0.888		

Table 4.4: Results of Hierarchical Measurement Model (DCs)

Second-Order Constructs	First-Order Constructs	Indicator Code	Indicators	Loadings	CR	AVE
Dynamic Capabilities (DCs) VIF = 1.478	Sensing (DC-SEN) Weights = 0.370 t-value = 9.661 VIF = 2.282	DC-SEN1	identification of customer needs	0.776	0.920	0.536
		DC-SEN2	tracking new market trends	0.831		
		DC-SEN3	analyzing competitors' actions	0.653		
		DC-SEN4	observing technological developments	0.807		
		DC-SEN5	organizing brainstorming sessions	0.648		
		DC-SEN6	involving customers / suppliers in the product development process	0.709		
		DC-SEN7	undertaking R&D to create new knowledge for developing new products / processes	0.803		
		DC-SEN8	undertaking R&D to try out new ideas having strategic / operational implication	0.777		
		DC-SEN9	assessing potential environmental impacts of products / processes / services	0.617		
		DC-SEN10	networking with public organizations / industrial associations / universities / others	0.660		
	Seizing (DC-SEI) Weights = 0.325 t-value = 7.928 VIF = 2.281	DC-SEI1	formulation of a strategy	0.765	0.922	0.542
		DC-SEI2	finding strategic partners	0.746		
		DC-SEI3	planning investments	0.808		
		DC-SEI4	capital budgeting	0.736		
		DC-SEI5	planning requisite human resources	0.762		
		DC-SEI6	redesigning / transforming business models	0.737		
		DC-SEI7	restructuring of governance structure	0.659		
		DC-SEI8	collaboration to acquire requisite knowledge / skills	0.662		
		DC-SEI9	collaboration to acquire requisite raw materials / resources	0.743		
		DC-SEI10	interdepartmental cooperation	0.735		
	Reconfiguring (DC-REC) Weights = 0.457 t-value = 14.326 VIF = 1.474	DC-REC1	merger with or acquisition of another organization	0.656	0.939	0.607
		DC-REC2	changed organizational structure	0.714		
		DC-REC3	made slight modifications in existing technology / machinery	0.839		
		DC-REC4	introduced new or significantly improved technology	0.826		
		DC-REC5	acquisition of a new manufacturing plant	0.727		
		DC-REC6	organized training to employees	0.826		

DC-REC7	acquisition of existing know-how	0.726
DC-REC8	adopted new business practices for organizing procedures	0.834
DC-REC9	adopted new methods of organizing external relations	0.812
DC-REC10	adopted new or significantly improved logistics	0.807

Table 4.5: Results of Hierarchical Measurement Model (PER)

Second-Order Constructs	First-Order Constructs	Indicator Code	Indicators	Loadings	CR	AVE
Performance (PER) VIF = 1.731	Objective - Environmental (PER-EN) Weights = 0.323 t-value = 15.947 VIF = 1.683	PER-EN1	reduced energy consumption	0.866	0.907	0.708
		PER-EN2	reduced waste generation	0.853		
		PER-EN3	reduced atmospheric pollution	0.821		
		PER-EN4	decreased water consumption	0.826		
	Objective - Financial (PER-FI) Weights = 0.247 t-value = 9.298 VIF = 1.516	PER-FI1	decreased manufacturing / operational costs	0.866	0.897	0.689
		PER-FI2	increased annual turnover	0.889		
		PER-FI3	increased profit growth	0.888		
		PER-FI4	increased market share	0.655		
	Subjective - Competitiveness (PER-CO) Weights = 0.361 t-value = 14.332 VIF = 2.835	PER-CO1	increased capability to introduce innovative products / services	0.845	0.921	0.744
		PER-CO2	improved quality of products/services	0.875		
		PER-CO3	improved brand value of products / services	0.914		
		PER-CO4	increased accessibility to new markets	0.813		
	Subjective - Corporate Reputation (PER-CR) Weights = 0.304 t-value = 12.379 VIF = 2.357	PER-CR1	improved corporate image among customers	0.785	0.900	0.691
		PER-CR2	improved relationship with suppliers / local community / regulatory organization	0.854		
		PER-CR3	increased satisfaction and support from investors/partners	0.841		
		PER-CR4	increased satisfaction and loyalty of employees	0.844		

To assess the discriminant validity, we tested the Fornell-Larcker criterion as well as the Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion (Henseler et al., 2015). The Fornell and Larcker criterion stipulates that the square root of the AVE of each construct should be greater than its correlation with other constructs (Chin, 2010). We found that the measurement model satisfied the Fornell-Larcker criterion (see Table 4.6). Henseler et al. (2015) pointed out the Fornell-Larcker criterion may not be sufficient to assess discriminant validity. Therefore, the HTMT criterion should accompany the Fornell-Larcker criterion (Ali et al., 2018). According to Hair et al. (2019), the HTMT value should ideally be less than 0.90 for conceptually similar constructs. We found that the measurement model also satisfied the HTMT criterion (see Table 4.7). Thus, the present study meets the criteria of discriminant validity.

Table 4.6: Discriminant Validity (Fornell-Larcker Criterion)

	CDE-CI	CDE-MT	CDE-TT	CE-CC	CE-DP	CE-RR	DC-REC	DC-SEI	DC-SEN	PER-CO	PER-CR	PER-EN	PER-FI
CDE-CI	0.848												
CDE-MT	0.544	0.929											
CDE-TT	0.662	0.626	0.900										
CE-CC	0.154	0.229	0.196	0.881									
CE-DP	0.190	0.338	0.245	0.673	0.744								
CE-RR	0.152	0.325	0.260	0.602	0.630	0.883							
DC-REC	0.301	0.337	0.405	0.286	0.428	0.352	0.779						
DC-SEI	0.282	0.337	0.386	0.165	0.215	0.129	0.480	0.736					
DC-SEN	0.226	0.345	0.359	0.229	0.312	0.188	0.496	0.729	0.732				
PER-CO	0.271	0.409	0.452	0.168	0.322	0.199	0.530	0.437	0.453	0.863			
PER-CR	0.281	0.424	0.408	0.197	0.273	0.267	0.472	0.371	0.368	0.749	0.832		
PER-EN	0.234	0.384	0.418	0.252	0.358	0.350	0.415	0.298	0.353	0.483	0.444	0.842	
PER-FI	0.336	0.263	0.347	0.198	0.245	0.220	0.295	0.285	0.268	0.475	0.375	0.522	0.830

Note:

The diagonal values (in bold) are the square root of the AVEs of latent variables and indicates the highest in any column or row.

Table 4.7: Discriminant Validity (HTMT Criterion)

	CDE-CI	CDE-MT	CDE-TT	CE-CC	CE-DP	CE-RR	DC-REC	DC-SEI	DC-SEN	PER-CO	PER-CR	PER-EN	PER-FI
CDE-CI	—												
CDE-MT	0.661	—											
CDE-TT	0.845	0.778	—										
CE-CC	0.203	0.296	0.264	—									
CE-DP	0.234	0.402	0.302	0.874	—								
CE-RR	0.202	0.419	0.351	0.841	0.814	—							
DC-REC	0.350	0.381	0.476	0.350	0.483	0.428	—						
DC-SEI	0.334	0.384	0.461	0.202	0.245	0.165	0.516	—					
DC-SEN	0.275	0.397	0.434	0.282	0.358	0.232	0.535	0.805	—				
PER-CO	0.322	0.471	0.549	0.211	0.371	0.249	0.579	0.484	0.507	—			
PER-CR	0.339	0.503	0.506	0.251	0.319	0.339	0.528	0.423	0.419	0.859	—		
PER-EN	0.282	0.449	0.512	0.321	0.416	0.442	0.460	0.335	0.400	0.549	0.515	—	
PER-FI	0.417	0.321	0.440	0.258	0.292	0.288	0.326	0.331	0.316	0.551	0.443	0.607	—

Note:

HTMT value less than 0.90 is a threshold limit for conceptually similar constructs (Hair et al., 2019)

Next to the aforementioned steps, we evaluated the formative measurement model. That is, we further assessed the psychometric properties of first-order constructs since first-order constructs act as formative indicators for second-order constructs in our proposed HCM. We first checked the significance and relevance of second-order weights using bootstrapping. Afterward, we checked the variance inflation factor (VIF) of constructs and indicators. We found that t-values were greater than 1.96 while the VIF values of all the constructs were less than 3.0 (see Tables 4.2, 4.3, 4.4, and 4.5). That is, the significance confirmed and no potential multicollinearity existed (Hair et al., 2019). In short, the overall measurement model of the present study is appropriate. Hence, we may proceed to evaluate the structural model.

4.4.2. Structural Model

First, we assessed the structural model for collinearity issues. We found that the VIF values of all the constructs were less than 3.0 (see Tables 4.2, 4.3, 4.4, and 4.5). Thus, there was no multicollinearity problem (Hair et al., 2019). Next, we assessed the R^2 values, which indicate in-sample predictive power, of the endogenous constructs. We found that the R^2 values of CE, DCs, and PER were equal to 0.180, 0.256, and 0.409 respectively. According to Cohen (1992), the standard R^2 values are 0.02 (small), 0.13 (medium), and 0.26 (large). However, in some disciplines or exploratory research, a lower R^2 value even 0.10 could be considered as a satisfactory value (Hair et al., 2019). Hence, the R^2 values in the present study are relatively high and acceptable. Afterward, we assessed the predictive relevance of the structural model through Stone-Geisser's Q^2 value using the blindfolding procedure (Ringle et al., 2015). The standard Q^2 values are 0 (small), 0.25 (medium), and 0.50 (large) (Hair et al., 2019). We found that the Q^2 values of CE, DCs, and PER were equal to 0.167, 0.244, and 0.392 respectively. Most importantly, we found that SRMR and NFI values were equal to 0.061 and 0.918 respectively. Thus, the present study meets the overall model fit criteria, that is, $SRMR < 0.08$ and $NFI > 0.90$, of PLS-SEM (Hair et al., 2017).

Finally, to test our proposed hypotheses, we computed the PLS algorithm with bootstrapping to assess path coefficients (standardized beta), significance levels, and t-values. We found that the direct effects of CDE and DCs on CE respectively had significant values of 0.177 ($p < 0.05$) and 0.301 ($p < 0.01$). That is, hypotheses 1 and 2 were found to be empirically supported (see Table 4.8). Similarly, the direct effects of DCs and CE on PER respectively had significant values of 0.541 ($p < 0.01$) and 0.178 ($p < 0.01$). That is, hypotheses 4 and 5 were found

to be empirically supported (see Table 4.8). The indirect effects of CDE on CE and DCs on PER respectively had significant values of 0.154 ($p < 0.01$) and 0.052 ($p < 0.01$). We assessed the mediation effects of DCs and CE, proposed in the hypotheses 3 and 6, as per the recent approach (Hair et al., 2017; Nitzl, Roldan, & Cepeda, 2016). We found that the relationship between CDE and CE was partially mediated by DCs. Similarly, the relationship between DCs and PER was partially mediated by CE. That is, hypotheses 3 and 6 were found to be empirically supported (see Table 4.9).

Table 4.8: Hypothesis Testing (Bootstrapping)

Hypotheses	Relationships	Type	Std Beta	Std Error	t-Values	p Values	f ²	q ²	95% CI LL	95% CI UL	Findings
H1	CDE → CE	Direct	0.177	0.072	2.474**	0.013	0.029	0.028	0.058	0.296	Supported
-	CDE → CE → PER	Indirect	0.033	0.020	1.613	0.107	-	-	0.005	0.070	Not Supported
-	CDE → DCs	Direct	0.502	0.068	7.451***	0.000	0.344	0.323	0.386	0.610	Supported
H2	DCs → CE	Direct	0.301	0.080	3.816***	0.000	0.084	0.074	0.171	0.432	Supported
H3	CDE → DCs → CE	Indirect	0.154	0.053	2.920***	0.004	-	-	0.074	0.245	Supported
-	CDE → DCs → CE → PER	Indirect	0.027	0.012	2.342**	0.019	-	-	0.009	0.048	Supported
-	CDE → DCs → PER	Indirect	0.275	0.065	4.284***	0.000	-	-	0.171	0.383	Supported
H4	DCs → PER	Direct	0.541	0.068	8.052***	0.000	0.428	0.413	0.424	0.647	Supported
H5	CE → PER	Direct	0.178	0.062	2.895***	0.004	0.046	0.035	0.074	0.276	Supported
H6	DCs → CE → PER	Indirect	0.052	0.020	2.695***	0.007	-	-	0.021	0.087	Supported

Note:

** $p < 0.05$; *** $p < 0.01$;

The t-Values of 1.65, 1.96, and 2.58 are respectively considered with the significance level of 10%, 5% and 1% (Two-Tailed Test)

The f^2 values indicates the effect size as mentioned in brackets: 0.35 (large), 0.15 (medium), and 0.02 (small) (Cohen, 1988)

The q^2 values indicates the predictive relevance as mentioned in brackets: 0.35 (large), 0.15 (medium), and 0.02 (small) (Henseler et al., 2009)

Table 4.9: Mediation Effect Analysis

Hypotheses	Relationships	Type	Std Beta	t Values	p Values	Significance	Conclusion
H3	CDE → CE	Direct	0.177	2.474**	0.013	Yes	Complementary
	CDE → DCs → CE	Indirect	0.154	2.920***	0.004	Yes	(Partial Mediation)
H6	DCs → PER	Direct	0.541	8.052***	0.000	Yes	Complementary
	DCs → CE → PER	Indirect	0.052	2.695***	0.007	Yes	(Partial Mediation)

Note:

** $p < 0.05$; *** $p < 0.01$;

The *t* Values of 1.65, 1.96, and 2.58 are respectively considered with the significance level of 10%, 5% and 1% (Two-Tailed Test)

4.5. Discussion and Implications

We investigated the role and the significance of DCs and their underlying organizational activities in CE implementation. Our PLS-SEM analysis demonstrates that DCs and their underlying organizational activities significantly facilitate CE implementation, which consequently improves the overall performance of organizations (see Figures 4.3 and 4.4). This paper confirms and extends the findings of previous studies (Kabongo & Boiral, 2017; O. Khan et al., 2020). Amui et al. (2017) highlighted that further research on DCs may guide organizations in transitioning towards a more sustainable industry. Indeed, our findings on the relation between CE implementation and overall performance may stimulate organizations' interest in CE adoption. Furthermore, our findings on the relation between DCs and CE implementation might help organizations in transforming their negative perceptions (if any) into strategic actions for CE implementation (Gusmerotti et al., 2019).

Figure 4.3: Summary of Findings (First Stage: Measurement Model)

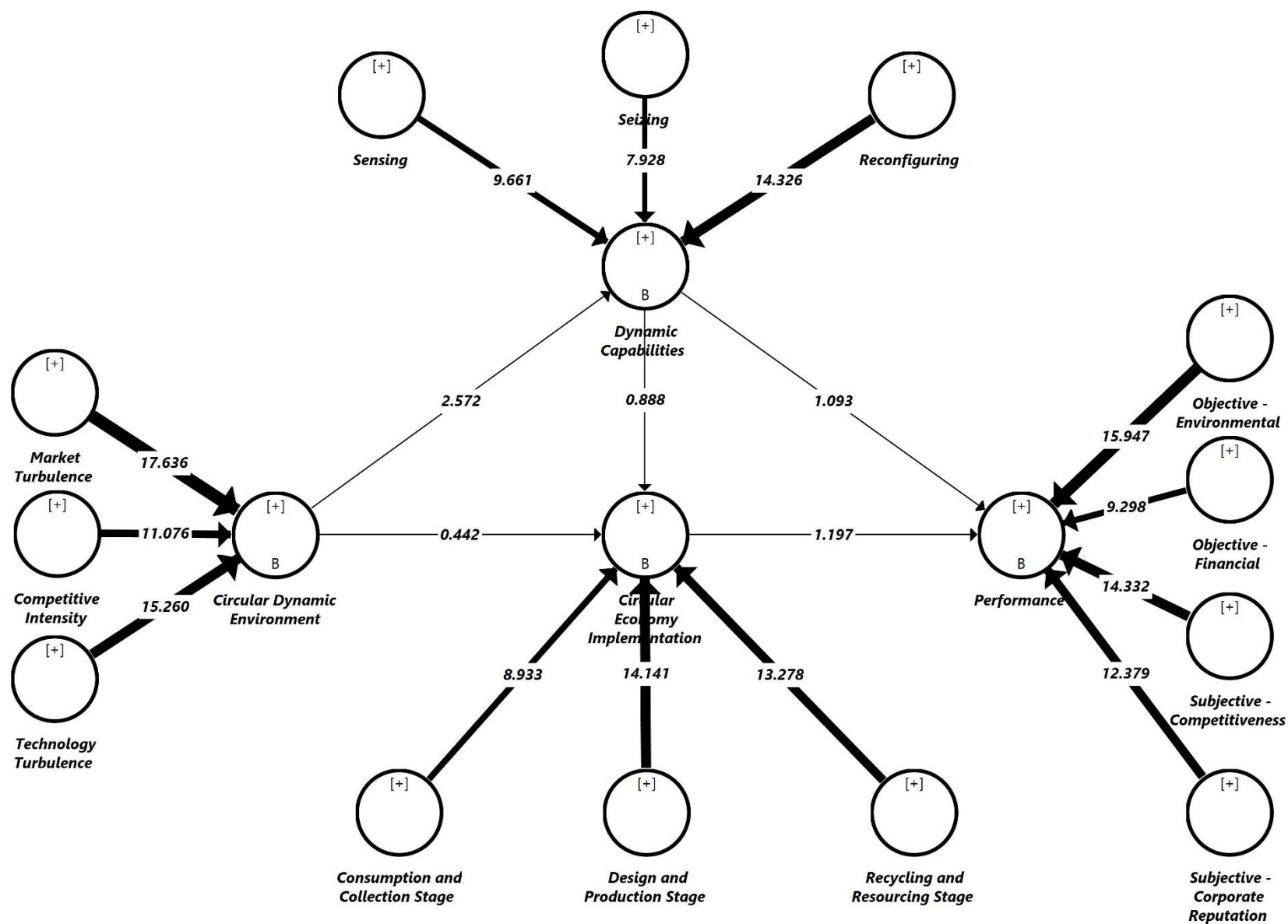
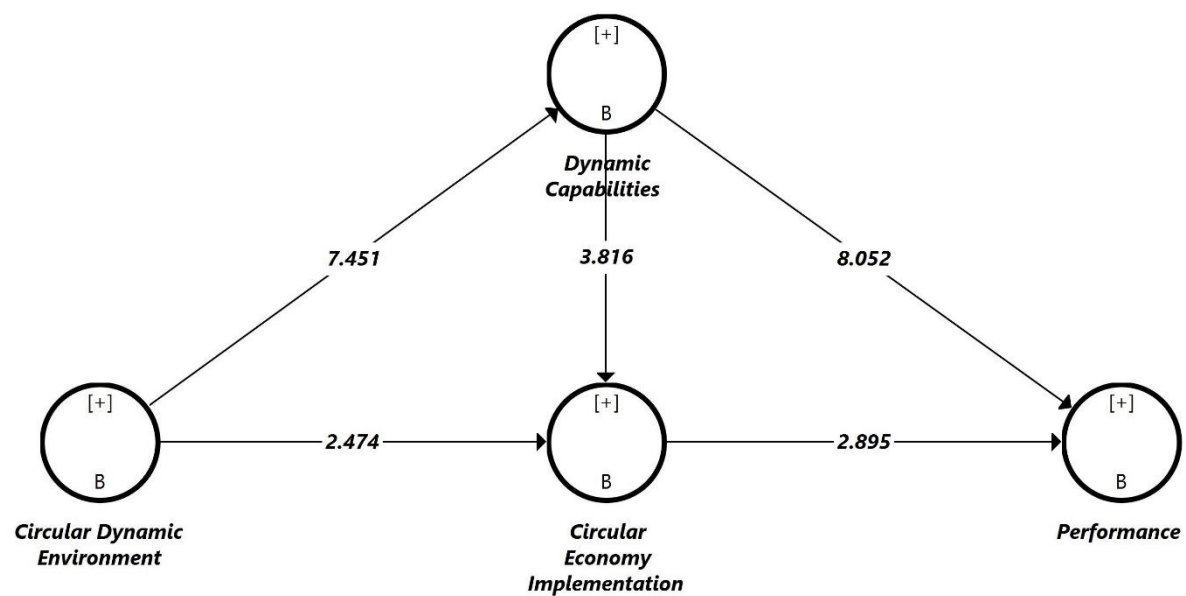


Figure 4.4: Summary of Findings (Second Stage: Structural Model)



Our PLS-SEM analysis shows that DCs has a positive and significant relationship with the overall performance of organizations. Our finding on the relation between DCs and performance is consistent with previous studies (Drnevich & Kriauciunas, 2011; Li & Liu, 2014). This paper extends that relation in the CE context and clarifies how DCs leads to improved performance. Protogerou et al. (2012) question whether DCs impact directly or indirectly on performance. Our PLS-SEM analysis shows that the relation between DCs and overall performance is mediated by CE implementation. That is, CE activities (or eco-innovation) act as a mechanism through which DCs influence overall performance (Zhou et al., 2019). This finding supports the argument that DCs may not always directly produce organizations' performance, rather DCs indirectly produce organizations' performance (Pezeshkan et al., 2016). Furthermore, this finding reasserts that superior performance is not exclusively the outcome of DCs (Wilden et al., 2013). Protogerou et al. (2012) could not find a significant direct relation between DCs and performance. It is worth noting that we measured overall performance whilst most scholars usually measure only financial or market performance (Protogerou et al., 2012; Wilden & Gudergan, 2015; Zhou et al., 2019). This may be a reason why we observed significant direct relation as well as significant indirect relation between DCs and overall performance.

Our PLS-SEM analysis shows that CE implementation has a positive and significant relationship with the overall performance of organizations. Scarpellini, Valero-Gil et al. (2020) measured eco-innovation being the crux of CE implementation. We operationalized CE implementation not just as an eco-innovation rather both product innovation and process innovation (Mousavi et al., 2018). Zhu et al. (2010) found that the adoption of CE practices improves environmental and financial performance. Our findings confirm that CE implementation does not only improve environmental and financial performance but also competitiveness and corporate reputation. This is an important finding and particularly valuable for organizations aiming towards CE. We found that environmental performance was greatly improved due to the confluence of DCs and CE implementation. However, financial performance was least improved compared to environmental performance, competitiveness, and corporate reputation. An obvious reason for this is that return on investments takes time and depends on various factors too. Nevertheless, CE provides a long-term competitive advantage. Therefore, organizations must strive for CE implementation.

Our PLS-SEM analysis shows that CDE has a positive and significant relationship with both DCs and CE implementation. Our finding on the relation between CDE and CE implementation implies that the ongoing momentum, that is, push by the EU and several national governments for CE (Korhonen et al., 2018), should be further accelerated. This paper contributes to the debate on whether a dynamic environment is a moderator or driver of DCs. Our finding on the relation between CDE and DCs confirms the driving role which is consistent with previous studies (Li & Liu, 2014; Teece et al., 1997). Scarpellini, Marín-Vinuesa, et al. (2020) found that environmental capabilities mediate the relationship between stakeholders' pressures and the circular scope of an organization. In this regard, our findings show that it is not just limited to environmental capabilities rather DCs as a whole mediate the relationship between CDE and CE implementation.

Our PLS-SEM analysis highlights the most important organizational activities through which organizations can identify and pursue CE opportunities. We found that sensing activities in order of importance are DC-SEN2, DC-SEN4, DC-SEN7, DC-SEN8, and DC-SEN1 (see Table 4.4). Seizing activities in order of importance are DC-SEI3, DC-SEI1, DC-SEI5, DC-SEI2, and DC-SEI9 (see Table 4.4). Reconfiguring activities in order of importance are DC-REC3, DC-REC8, DC-REC4, DC-REC6, DC-REC9 (see Table 4.4). A significant barrier to eco-innovation is that organizations are usually not able to identify new and profitable opportunities (Porter & Linde, 1995). In this regard, our finding suggests that a sensing activity, assessment of potential environmental impacts of products, can eliminate that barrier. This finding implies that if an organization has the capabilities or tool such as eco-management and audit scheme (EMAS) and life cycle assessment (LCA) then its probability to accomplish eco-innovation (Daddi et al., 2011) or sustainable innovation (Mousavi & Bossink, 2017) would be much higher than other organizations. EMAS and LCA are dynamic (sensing) capabilities and essential tool to sense a CE opportunity (O. Khan et al., 2020). Indeed, the significance and effectiveness of LCA have been already proven in the CE context (Daddi et al., 2017). Therefore, organizations must adopt LCA to discover CE opportunities.

Our findings demonstrate that all conventional sensing activities (Teece, 2007), that is, identification of customer needs, tracking new market trends, analyzing competitors' actions, observing technological developments, involving customers or suppliers, and undertaking R&D play a pivotal role in identifying new opportunities and gaining a competitive advantage. Therefore, organizations aiming towards CE must incorporate these activities into their day-to-

day operations. Our findings suggest that R&D is crucial for sensing a CE opportunity. Chakrabarty and Wang (2012) show that organizations' R&D capabilities facilitate sustainability practices. It is understood that CE objectives demand new knowledge and skills. In this regard, our findings suggest that a seizing activity, collaboration with research institutions to acquire requisite knowledge and skills, is highly valuable and successful (De Marchi, 2012). Lastly, our findings indicate that organizations should organize brainstorming sessions and do networking with other organizations to identify CE opportunities.

Our findings further demonstrate that the elements of strategic planning, that is, formulation of a strategy, finding strategic partners, planning investments, capital budgeting, and planning human resources, play a significant role in seizing identified CE opportunities. It is worth noting that the aforementioned activities usually involve risky-decisions. Daddi et al. (2019) pointed out that top management might experience "*paradoxical tensions*" while taking CE decisions. Nevertheless, environmentally conscious top management is more likely to pursue CE (Gusmerotti et al., 2019). Therefore, the role of top management in strategic planning and/or CE decisions is quite pivotal. In this regard, our findings indirectly suggest that top management should be very competent and hold a risk-taking ability. In short, organizations aiming towards CE must be competent in strategic planning and/or possess strong seizing capabilities.

Our findings suggest that organizations must have a strong capability for diverse collaborations to operationalize a CE business model. Indeed, most organizations cannot achieve CE without having collaborations for requisite knowledge, skills, and recyclable materials. This statement is in line with previous studies that substantiated that tackling sustainability challenges essentially need collaborations (Hofmann et al., 2012). Some scholars pointed out that the allocation of resources and planning investments are key strategic decisions that ultimately determine an organization's performance (Agarwal & Helfat, 2009). They emphasize on investments not only in R&D but also in acquisitions. Our results confirm that reconfiguring capabilities such as mergers or acquisitions and gaining technological competencies play an important role in CE implementation. Our findings reassert that reconfiguring capabilities strongly affects organizations' performance (Girod & Whittington, 2017). It implies that organizations can never achieve CE without having strong reconfiguring capabilities.

Mousavi et al. (2018) show that DCs, that is, sensing, seizing, and reconfiguring capabilities positively contribute to sustainable innovations, but sensing activities play the most prominent role. However, our findings show that reconfiguring activities play the most prominent role in CE implementation. Scholars perceive that measuring DCs is challenging since literature lacks generally accepted approaches (Zhou et al., 2019). Nevertheless, we attempted to overcome this issue and captured the measurement of the degree of DCs (Mousavi et al., 2018). In short, this paper demonstrates that DCs is not vague or fuzzy concept that cannot be measured, rather specific processes that can be explored theoretically as well as empirically.

4.6. Conclusion

The main objective of this paper was to investigate the role and significance of DCs for CE implementation. We empirically demonstrated that DCs significantly facilitate CE implementation, which consequently improves the overall performance of organizations. Therefore, we unequivocally suggest that organizations must strive to develop and apply sensing, seizing, and reconfiguring capabilities in order to identify and accomplish CE opportunities. The top management of organizations should clearly define CE objectives, allocate required human and financial resources, and involve all stakeholders for those CE objectives.

Despite profound merits, this paper contains some limitations. Although we took suggested measures to ensure the quality of the data. However, social desirability bias which is commonly found in surveys cannot be ruled out. Simply put, the respondents' perceptions may not coincide with the objective and rational reality. Furthermore, the overall performance of organizations was measured with self-reported data which is another usual limitation of surveys. The survey was conducted in Italy and we got useful data from just 220 organizations. Therefore, the findings of this paper can only be generalized to other countries with caution. Nevertheless, this paper suggests some future research opportunities. For instance, a similar study with a larger sample size may be replicated in other countries to get more valuable insights. It might be interesting to analyze the proposed hypotheses in different settings or by including other sectors. Although we perceive moderation occurs, future studies may investigate whether or not CDE moderates these relationships: (1) DCs and CE implementation, and (2) DCs and overall performance. Lastly, a retrospective longitudinal study on how DCs leads to CE implementation would be highly valuable.

CHAPTER 5

Behavioral Practices of Organizations towards a Circular Economy for Plastics: Evidence from Various Sectors

Redrafted from:

Khan, O., Daddi, T., Slabbinck, H., Kleinhans, K., Vazquez-Brust, D., & De Meester, S. (2020). **Assessing the determinants of intentions and behaviors of organizations towards a circular economy for plastics.** *Resources, Conservation and Recycling*, 163, 105069. <https://doi.org/10.1016/j.resconrec.2020.105069>

5.1. Introduction

The invention of plastics has significantly facilitated our modern life. However, plastics, that were being hailed as a “*scientific wonder*” until a few decades ago, are now being reviled as an “*environmental scourge*” (Plummer, 2018). Notwithstanding increasing concern on environmental issues, the production of plastics is still increasing rather than decreasing. To illustrate, the annual production of plastics in the world and the EU have reached around 360 and 62 million tonnes respectively in 2018 and is expected to grow further in the upcoming years (PlasticsEurope, 2019). Simply put, the production of plastics is inevitable since our modern life is just unthinkable without plastics. However, the problem is that this huge production of plastics, particularly single-use plastics, ultimately turns into mountains of plastic waste generated every year. For instance, the world spawned around 302 million tonnes of plastic waste in 2015 (Geyer, Jambeck, & Law, 2017); the EU generated around 29 million tonnes of plastic waste in 2018 (PlasticsEurope, 2019). It is worth noting that the production of plastics annually consumes 4-8% of the total crude oil extraction in the world (Huysman, De Schaepmeester, Ragaert, Dewulf, & De Meester, 2017). Hence, if this huge amount of plastic waste is just disposed of rather than being recycled then it is also a huge loss of resources. To remedy such concerns, the concept of a circular economy for plastics has emerged as a promising solution.

A circular economy for plastics implies that the value of plastics in the economy should be maintained without leakage into the natural environment (Ellen MacArthur Foundation, 2017). Although several studies have demonstrated that a majority of plastics can be recovered and transformed into new products (Ragaert, Delva, & Van Geem, 2017; Ragaert et al., 2020), only 9% of the total plastic waste was recycled in the world from 1950 to 2015 (Geyer et al., 2017). Despite European governments encouraging the circular economy, by 2018 the EU recycled on average only 30% of all plastic waste, and the European Parliament estimated that 95% of the value of plastic packaging material was lost to the economy after a short first-use cycle (European Parliament, 2018b). Therefore, the potential to recycle plastic waste is still largely unexploited. Accordingly, the European Commission announced “*a European Strategy for Plastics in a Circular Economy*” (European Commission, 2018), and the EU set new recycling targets for plastics at a minimum of 50% by 2025 and 55% by 2030 (EU, 2018). Although some technical approaches and alternative materials have been proposed to tackle plastic waste, technical approaches alone cannot completely overcome this problem since

psychological and behavioral traits often undermine the viability of technical solutions (Heidbreder et al., 2019). Simply put, both technical solutions and pro-environmental human behavior are essential to increase plastic recycling rates. In short, to develop effective policies, a better understanding of human behavior related to plastic recycling is needed.

The Theory of Planned Behavior (TPB) (Ajzen, 1985) is one of the most influential theories used to understand human behavior. A plethora of previous studies had employed TPB to predict human intention and behavior to waste recycling (Botetzagias et al., 2015; Chen & Tung, 2010; Davis, Phillips, Read, & Iida, 2006; F. Khan, Ahmed, & Najmi, 2019; Knussen & Yule, 2008; Knussen, Yule, MacKenzie, & Wells, 2004; Nigbur, Lyons, & Uzzell, 2010; Ramayah, Lee, & Lim, 2012; Taylor & Todd, 1995; Tonglet et al., 2004). However, previous studies mainly considered a sample from households (e.g. heads of the family or housewives) or academic institutions (e.g. adult students) to predict individual-level outcomes (Geiger et al., 2019). Somewhat surprisingly, previous studies rarely considered a sample from organizations (e.g. managers or employees) to predict organizational-level outcomes. It is worth mentioning that previous studies overlooked organizations as a context not only in the case of waste recycling but also in the case of other pro-environmental behaviors (Yuriev et al., 2020). A few studies have employed TPB to predict managers' intentions and behaviors to other environmental concerns (Cordano & Frieze, 2000; Flannery & May, 2000; Liston-Heyes & Vazquez Brust, 2016; Papagiannakis & Lioukas, 2012; Sánchez-Medina, Romero-Quintero, & Sosa-Cabrera, 2014; Vazquez Brust & Liston-Heyes, 2010). However, to the best of our knowledge, corporate decision makers' intentions and behaviors to waste recycling, particularly plastics recycling, remains still unexplored.

To contribute to the aforementioned knowledge gap, our study specifically focuses on organizations and their decision makers for two reasons. First, organizations generate a large proportion of plastic waste commonly referred to as commercial plastic waste (Deloitte, 2017). However, this plastic waste, though technically eligible for recycling, is often not properly collected or recycled because organizations are either passive or not connected to appropriate systems. Second, decision makers are the key individuals of organizations. Here, it is worth noting that though circular economy decisions are very complex but often the perceptions, attitudes, and personal values of decision makers directly influence organizations' strategic actions towards a circular economy (Daddi et al., 2019; Gusmerotti et al., 2019). In short, both active participation of organizations and the role of decision makers are pivotal to implement

a circular economy for plastics. March and Simon (1958) stated that “*propositions about organizations are statements about human behavior*” (p. 26) and Liedtka (1991) stated that “*organizations do not make decisions – individuals do*” (p. 543). Therefore, we can refer to decision makers’ intentions as organizations’ intentions and vice versa.

Our study aims to understand the intentions and behaviors of organizations in Belgium towards a circular economy for plastics. Our study contributes to the literature of both the TPB and circular economy in the following manner. First, our study empirically assesses the determinants of intentions and behaviors of organizations to implement best practices of plastic recycling by employing the Partial Least Squares Structural Equation Modeling (PLS-SEM). Notably, our study empirically assesses some barriers to a circular economy for plastics. Accordingly, our study suggests how the intention-behavior gap may be overcome to attain a circular economy for plastics. Second, unlike previous studies on recycling behavior, our study predicts the intentions and behaviors of organizations by combining both individual-level and organizational-level characteristics. Therefore, we contribute to an outstanding gap in TPB highlighted by Yuriev et al. (2020), who pointed out that “*identifying and assessing specific barriers associated with the workplace context could be crucial for achieving better employee engagement and a lower ecological footprint for organizations*” (p. 7). The rest of our study proceeds as follows. Section 5.2 presents the theoretical framework and accordingly formulates our research hypotheses. Section 5.3 describes how the constructs are measured, data is collected, and hypotheses are tested. Section 5.4 presents the results, whereas section 5.5 discusses the main results and their implications. Finally, section 5.6 concludes the discussion, highlights the limitations, and suggests some future research opportunities.

5.2. Theoretical Framework and Hypotheses

Fishbein and Ajzen (1975) proposed the Theory of Reasoned Action (TRA) by assuming that human behavior can be controlled by human will. However, TRA was criticized that human behavior could not be fully explained without considering various factors that affect human intentions. As a response to overcome this shortcoming of TRA, Ajzen (1985) proposed the Theory of Planned Behavior (TPB) by including another variable into the TRA model, that is, perceived behavioral control (Ajzen, 1991). TPB postulates that attitude towards behavioral intention, subjective norms, and perceived behavioral control together shape behavioral intention as well as actual behavior. To date, TPB has received around 90,000 citations (Yuriev

et al., 2020). Despite some criticism and several competing behavioral models, the TPB model is still regarded as the most effective model for designing behavioral interventions (Yuriev et al., 2020). Therefore, researchers have been increasingly employing the TPB model across various disciplines including environmental science and sustainability management (Daddi et al., 2018; Si et al., 2019).

According to TPB (Ajzen, 1985), behavioral intention towards the actual behavior is collectively influenced by attitude, subjective norms, and perceived behavioral control. Ajzen (1991) defines attitude as *“the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question”* (p. 188). A positive or negative attitude of an individual towards a certain behavior respectively strengthens or weakens his/her intention to perform that certain behavior in question. Previous studies support the relationship between attitude and behavioral intention (F. Khan, Ahmed, & Najmi, 2019; Tonglet et al., 2004). In our study, we interpret attitudes as *“the extent to which plastic recycling is valued by decision makers, whether positive or negative”*. O. Khan et al. (2020) show that environmentally conscious decision makers successfully implemented a circular economy for plastics in their organizations. Therefore, we assume that those decision makers who hold positive attitudes towards plastic recycling are more likely to implement the best practices of plastic recycling in their organizations.

Next to attitude, Ajzen (1991) defines subjective norms as *“the perceived social pressure to perform or not to perform the behavior”* (p. 188). The behavioral intention of an individual is usually influenced by the expectations of a group or society to which he/she belongs. Fishbein and Ajzen (2011) explicate norms as injunctive norms (*perceptions of what others consider to be correct behavior*) and descriptive norms (*perceptions of what others are actually doing*). Many previous studies support the relationship between subjective norms and behavioral intention (Chen & Tung, 2010; F. Khan, Ahmed, & Najmi, 2019; Papagiannakis & Lioukas, 2012; Sidique, Lupi, & Joshi, 2010). Herein, we refer to subjective norms as societal norms of plastic recycling. It is worth noting that the societal norms of plastic recycling may vary in different contexts. For instance, the following statement may be either true or untrue for any country that a specific sector may be bound to comply with plastic recycling, whereas other sectors may not have any compelling reasons to do so. Therefore, a decision maker's intention may be influenced by the fact that whether or not the neighboring or similar organizations to his/her organization are supporting plastic recycling (Thoradeniya, Lee, Tan,

& Ferreira, 2015). Similarly, a decision maker's intention may also be influenced by the fact that whether or not other individuals in his/her organization are in favor of plastic recycling. In our study, we interpret subjective norms as *"the extent to which decision makers are influenced by perceived norms of plastic recycling in their organizational surroundings"*. We assume that those decision makers who perceive positive societal norms of plastic recycling are more likely to implement the best practices of plastic recycling in their organizations.

Next to subjective norms, Ajzen (1991) defines perceived behavioral control as *"the perceived ease or difficulty of performing the behavior"* (p. 188). The behavioral intention of an individual is dependent on his/her perceived ability or power to perform that certain behavior in question. Previous studies support the relationship between perceived behavioral control and behavioral intention (Boldero, 1995; Tonglet et al., 2004). Here, it is worth mentioning that perceived behavioral control is a determinant of both behavioral intention and actual behavior (Fishbein & Ajzen, 2011). In our study, we interpret perceived behavioral control as *"the perceived power (and knowledge) of decision makers to implement plastic recycling"*. We assume that those decision makers who hold strong perceived behavioral control are more likely to implement the best practices of plastic recycling in their organizations. In light of the above discussion and taking this statement into account that decision makers' intentions can be referred to as organizations' intentions and vice versa, we propose our first, second, and third hypotheses as following (see Figure 5.1):

H1: Attitudes of decision makers positively influence organizations' intentions to implement best practices of plastic recycling

H2: Subjective norms perceived by decision makers positively influence organizations' intentions to implement best practices of plastic recycling

H3: Perceived behavioral control of decision makers positively influences organizations' intentions to implement best practices of plastic recycling

In our study, we interpret behavioral intentions as *"a perceived likelihood or subjective probability of decision makers that they will implement plastic recycling in their organizations"*. We assume that those decision makers that hold positive behavioral intentions are more likely to implement best practices of plastic recycling in their organizations. In other

words, it can be stated that those organizations that hold positive intentions are more likely to contribute to a circular economy by pursuing the best practices of plastic recycling. Researchers generally employ the determinants of the TPB model (attitude, subjective norms, and perceived behavioral control) to predict actual behavior as individual-level outcomes. However, in line with previous studies (Papagiannakis & Lioukas, 2012; Singh, Chakraborty, & Roy, 2018), we aim to predict actual behavior as organizational-level outcomes. This approach is referred to as a cross-level relationship (Cordano & Frieze, 2000; Klein, Dansereau, & Hall, 1994). In our study, we interpret actual behaviors as *“the extent to which organizations have implemented best practices of plastic recycling”*. As these best practices include reducing, reusing, and recycling of plastic waste, we can refer to actual behaviors as organizations’ behaviors towards a circular economy for plastics. We assume that as many recycling practices an organization would successfully implement, as much that organization would contribute to a circular economy for plastics. It is worth noting that perceived behavioral control may directly influence actual behavior, but previous studies on recycling did not assess the relationship between perceived behavior control and recycling behavior (Taylor & Todd, 1995; Tonglet et al., 2004). In light of the above discussion and taking this statement into account that decision makers’ intentions can be referred to as organizations’ intentions and vice versa, we propose our fourth and fifth hypotheses as following (see Figure 5.1):

H4: Organizations’ intentions positively influence organizations’ behaviors towards a circular economy for plastics

H5: Perceived behavioral control of decision makers positively influences organizations’ behaviors towards a circular economy for plastics

Although the traditional components of the TPB model (attitude, subjective norms, and perceived behavioral control) have been successful in predicting human intentions and behaviors, many researchers argue that additional variables should be incorporated into the TPB model to enhance its explanatory power (Botetzagias et al., 2015; Chen & Tung, 2010; Geiger et al., 2019; F. Khan, Ahmed, & Najmi, 2019; Singh et al., 2018; Tonglet et al., 2004). Ajzen (1991) points out that *“the theory of planned behavior, is, in principle, open to the inclusion of additional predictors”* (p. 199). Thus, TPB allows researchers to extend the TPB model considering the context and objective of their studies. It is worth noting that the traditional components of the TPB model do not directly influence organizations’ behaviors.

Furthermore, although decision makers' intentions influence organizations' behaviors, other factors may also influence organizations' behaviors. So, we argue that the TPB model should be extended with variables that capture factors that are more outside the scope of decision makers. Yuriev et al. (2020) point out that researchers should focus on factors that influence behaviors rather than just explaining factors that influence intentions. They suggest that researchers should aim to overcome the intention-behavior gap. Therefore, we modify the TPB model by incorporating three variables namely, pressures, barriers, and enablers as direct factors that may influence organizations' behaviors. For incorporating additional constructs into the TPB model, we followed the guidelines of Whetten, Felin, and King (2009).

We refer to pressures as regulatory and market pressures. We interpret pressures as *“the perceived push on organizations, to implement best practices of plastic recycling, from regulatory bodies, competitors, and customers”*. Some studies point out that such pressures directly improve organizations' environmental performance (Daddi, Testa, Frey, & Iraldo, 2016; Phan & Baird, 2015; Singh et al., 2018). Jain, Singhal, Jain, and Bhaskar (2020) point out that such pressures influence organizations' intentions toward recycling. It is worth noting that though regulatory pressure may be the same, market pressure on each organization or sector may be different. We assume that those organizations, whose decision makers perceive stronger pressures on their organizations, are more likely to implement best practices of plastic recycling. That is, those organizations are more likely to contribute to a circular economy for plastics. It is worth mentioning that we differentiate between subjective norms and pressures mainly in terms of construct operationalization. Suppose neighboring organizations have already implemented a specific technology, yet an organization may decide not to implement that technology because of financial burdens. However, if there are any regulatory pressures, an organization would have to implement that technology sooner or later. Thus, we specify a direct relation between pressures and actual behaviors.

We refer to barriers as factors that hinder an organization to implement best practices of plastic recycling. In our study, we interpret barriers as *“lack of requisite resources and/or appropriate opportunities”*. We assume that those organizations that encounter substantial barriers are very unlikely to implement best practices of plastic recycling. In contrast, we refer to enablers as factors that may facilitate an organization to implement best practices of plastic recycling. In our study, we interpret enablers as *“necessary actions or potential solutions, if introduced or implemented, may motivate organizations towards plastic recycling”*. We

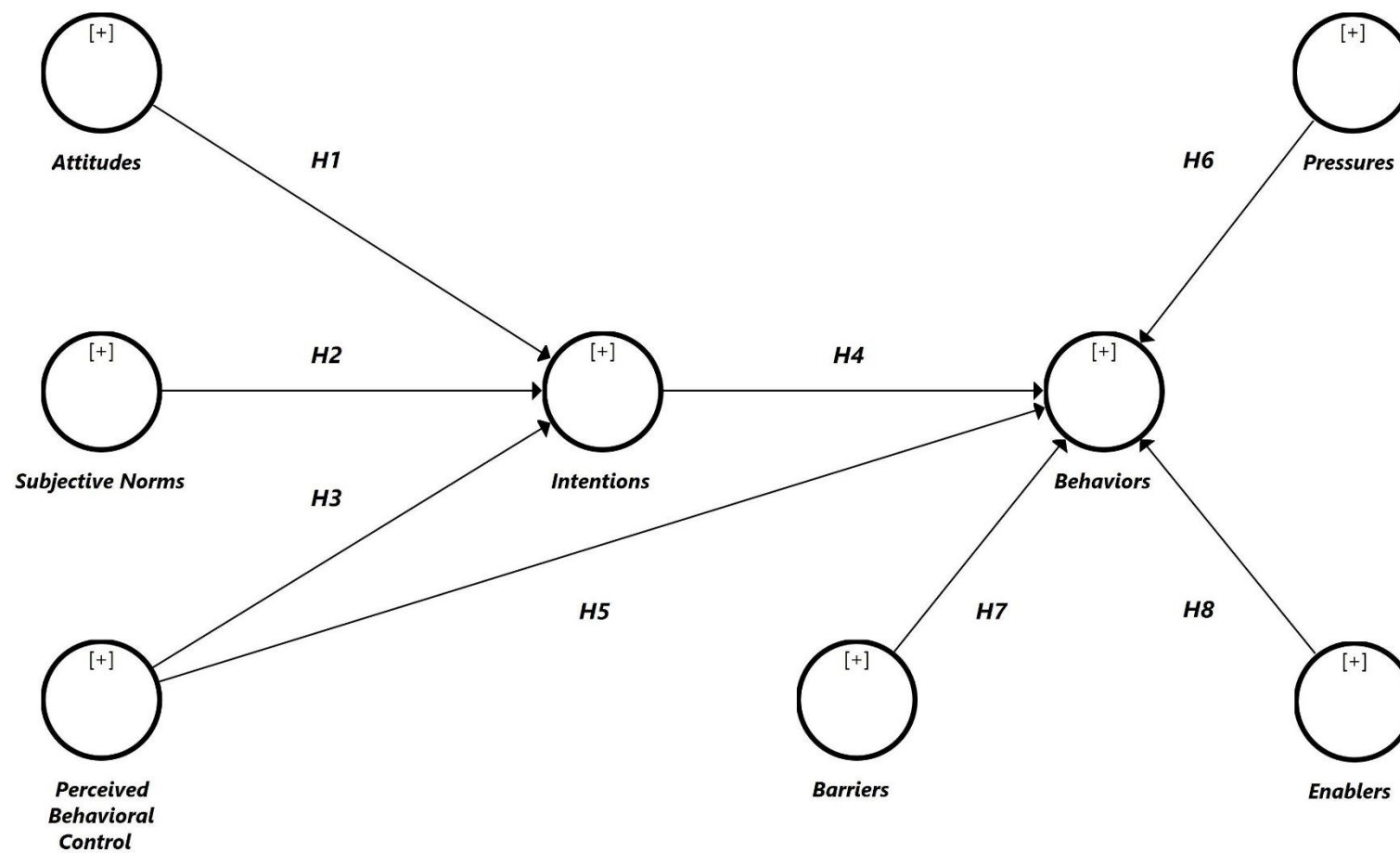
assume that if organizations are properly facilitated then they will enthusiastically contribute to a circular economy for plastics. In light of the above discussion, we finally propose our sixth, seventh, and eighth hypotheses as following (see Figure 5.1):

H6: Pressures on organizations positively influence organizations' behaviors towards a circular economy for plastics

H7: Barriers negatively influence organizations' behaviors towards a circular economy for plastics

H8: Enablers positively influence organizations' behaviors towards a circular economy for plastics

Figure 5.1: Research Model (Hypotheses)



5.3. Methodology

5.3.1. Data Collection

We developed our questionnaire as per the recommended guidelines (Churchill, 1979). First of all, we shortlisted relevant previous studies. Next, we identified indicators related to the constructs in question from those previous studies. This step involved compilation and adaptation of indicators considering the context and objective of our study. Then, we drafted a trial questionnaire, which was reviewed by four academicians and practitioners. Consequently, we further improved our questionnaire. Afterward, we translated our questionnaire into regional languages to facilitate the target audience. We assumed that questionnaire in regional languages may increase the response rate. Then, we preliminary tested our questionnaire with some local organizations. The obtained data satisfied the psychometric properties as described in section 5.4.1. That is, the aforementioned step confirmed the suitability and validity of our questionnaire.

Our study focuses on Belgium which has been under-represented in the previous literature. Belgium is highly influential in EU decision making as it hosts the European parliament. The plastic generation per inhabitant in Belgium is the same as the average of EU-28. However, the plastic recycling rate of Belgium is moderately above compared to EU-28 and significantly lower compared to the Netherlands (European Parliament, 2018b). We extracted a huge list of organizations through the ORBIS database. Then, we randomly selected a sample of 5000 organizations. Finally, we invited those organizations through emails to participate in our study - the online survey which remained active from January to February 2020. We explicitly requested organizations that the online survey should be completed by a decision maker (Owner/CEO/Director/General Manager/Environmental Manager). Nevertheless, in the online survey, we asked respondents to specify their designations in case their designation is even other than the listed designations. We asked only one respondent per organization to complete the online survey. Although we sent reminder emails in due time, we just received data responses (observations) from 730 organizations through Qualtrics (an online survey tool). However, to ensure the reliability of our dataset, we followed very strict criteria of data screening. That is, we deleted observations with more than 15% missing values (Hair et al., 2013), retaining 637 observations in our dataset for further analysis. The majority of organizations that participated in our study are small size organizations though they belong to various sectors (see Table 5.1).

Table 5.1: Description of Sample

Variable	Description	Number of Organizations
NACE Sector	Administrative and Support Services	50
	Construction	68
	Education	7
	Electricity, Gas, and Water Supply	3
	Information and Communication	22
	Manufacturing	84
	Others	222
	Transportation and Storage	24
	Wholesale and Retail Trade	157
Number of Employees	1 – 49	499
	50 – 249	101
	250 – 999	26
	1000 – 4999	8
	More than 5000	3
Annual Income	Less than 1,000,000 euro	235
	1,000,001 - 2,000,000 euro	104
	2,000,001 - 10,000,000 euro	138
	10,000,001 - 50,000,000 euro	91
	Higher than 50,000,000 euro	38
	Undisclosed	31

Note:

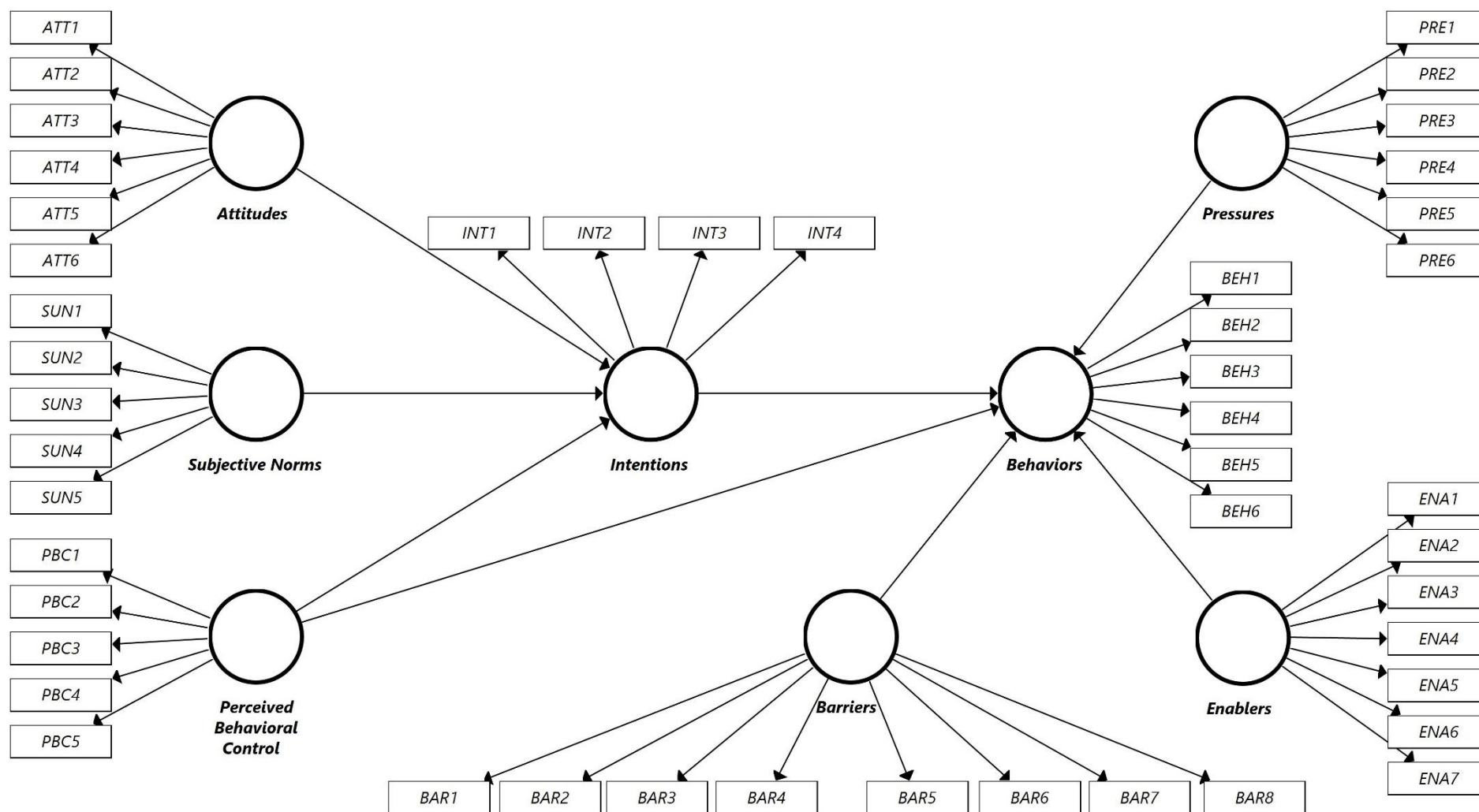
NACE Sector: <https://data.be/en/nace>

5.3.2. Constructs and Measures

The original TPB model is based on five constructs namely, attitudes (ATT), subjective norms (SUN), perceived behavioral control (PBC), behavioral intentions (INT), and actual behaviors (BEH) (Ajzen, 1991). We extended the TPB model by incorporating three constructs namely, pressures (PRE), barriers (BAR), and enablers (ENA) as per the context and objective of our study. Thus, our proposed model, having reflective indicators, is an extended version of the TPB model (see Figure 5.2). It is worth mentioning that our proposed model is a mixed-determinants model, incorporating concepts on individual-level (ATT, SUN, PBC) as well as on organizational-level (INT, BEH, PRE, BAR, ENA) (Klein et al., 1994). Accordingly, we operationalized each construct on its own-level. To measure each construct, we mainly adapted indicators from previous studies (Abdulrahman, Gunasekaran, & Subramanian, 2014; European Commission, 2016; F. Khan, Ahmed, Najmi, & Younus, 2019; Nigbur et al., 2010; Phan & Baird, 2015; Sánchez-Medina et al., 2014; Sidique et al., 2010; Simpson, 2012; Taylor & Todd, 1995; Thoradeniya et al., 2015; Tonglet et al., 2004).

For attitudes (ATT), subjective norms (SUN), perceived behavioral control (PBC), and behavioral intentions (INT), we asked respondents to rate on a Likert scale (1. *strongly disagree*, 2. *disagree*, 3. *undecided*, 4. *agree*, 5. *strongly agree*) whether they agree or disagree with the listed statements (see Table 5.2). For actual behaviors (BEH), we asked them to rate on a Likert scale (1. *not considering it*, 2. *considering it*, 3. *planning it*, 4. *initiating implementation*, 5. *implementing successfully*) whether they have been considering or implementing the listed practices (see Table 5.2) in their organizations. For pressures (PRE), we asked them to rate on a Likert scale (1. *strongly disagree*, 2. *disagree*, 3. *undecided*, 4. *agree*, 5. *strongly agree*) whether they agree or disagree that the listed factors (see Table 5.2) push their organizations towards recycling plastic waste. For barriers (BAR), we asked them to rate on a Likert scale (1. *strongly disagree*, 2. *disagree*, 3. *undecided*, 4. *agree*, 5. *strongly agree*) whether the listed factors (see Table 5.2) cause hindrance in recycling plastic waste. Finally, for enablers (ENA), we asked them to rate on a Likert scale (1. *unhelpful*, 2. *slightly helpful*, 3. *moderately helpful*, 4. *very helpful*, 5. *extremely helpful*) to what extent the listed actions (see Table 5.2), if introduced or implemented, may help their organizations in recycling plastic waste.

Figure 5.2: Hierarchical Measurement Model



5.3.3. Data Analysis

To analyze our dataset, we employed structural equation modeling (SEM) since it is regarded as a very robust and powerful statistical tool in various disciplines (Hair, Sarstedt, Pieper, et al., 2012). To conduct SEM, two main approaches are known as covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM). PLS-SEM is advised when the research is rather exploratory, the focus is on predicting the phenomena, rather than on understanding relationships between phenomena and the model is rather complex (Hair et al., 2011). Moreover, PLS-SEM may exhibit higher statistical power compared to CB-SEM (Wetzels et al., 2009) and most researchers have employed PLS-SEM in related studies on recycling and TPB (F. Khan, Ahmed, & Najmi, 2019). For these reasons, we opted for PLS-SEM and used SmartPLS 3 to test our proposed research model (Ringle et al., 2015).

It is worth noting that the sample size of our study comfortably met the recommended rule of thumb, that is, ten times to the number of indicators of the construct with the highest number of indicators (Hair, Sarstedt, Ringle, et al., 2012). So practically, as barriers (BAR) has 8 indicators, a sample of 80 respondents should already be sufficient to test our model. Interestingly, the sample size of our study, 637 observations, is relatively high in comparison with the sample size of most other studies who used PLS-SEM, both in management (Hair, Sarstedt, Pieper, et al., 2012) as well as in most other studies on similar topics (F. Khan, Ahmed, & Najmi, 2019; F. Khan, Ahmed, Najmi, et al., 2019; Nigbur et al., 2010; Papagiannakis & Lioukas, 2012; Sidique et al., 2010; Tonglet et al., 2004). Chin (2010) recommends a two-step approach to examine and interpret PLS-SEM. Accordingly, firstly, we assessed the measurement model. For that, we applied the recommended settings by using a PLS algorithm with 300 iterations. Secondly, we estimated the structural model to examine our proposed hypotheses by using bootstrapping with 5000 subsamples (Hair, Sarstedt, Ringle, et al., 2012). We carefully followed the recommended rules and guidelines while conducting PLS-SEM analysis and reporting the results (Chin, 2010; Hair et al., 2019).

5.4. Results

5.4.1. Measurement Model

We estimated the indicator reliability, internal consistency, convergent validity, and discriminant validity for evaluating the measurement model (Hair et al., 2019). According to Hair et al. (2011), indicator loadings should ideally be higher than 0.70. Nevertheless, indicator loadings between 0.40 and 0.70 are also acceptable if the average variance extracted (AVE) of the construct is higher than 0.50 (Hair, Sarstedt, Ringle, et al., 2012; Hulland, 1999). We found that all the indicator loadings are ranging between 0.469 and 0.896 (see Table 5.2), except the two indicators of actual behaviors (BEH) construct. For convergent validity, the AVE of each construct should be higher than 0.50 (Hair et al., 2011). However, we found that the AVE of actual behaviors (BEH) construct was 0.398, while indicator loadings of BEH4 and BEH5 were 0.475 and 0.476 respectively. Thus, after the deletion of two indicators of actual behaviors (BEH) construct, our study satisfied the criteria of indicator reliability and convergent validity (see Table 5.2).

For internal consistency, Cronbach's alpha (α) and composite reliability (CR) values should ideally be higher than 0.70 (Ali et al., 2018; Hair et al., 2011). Even though both Cronbach's α and CR are measures of internal consistency, Hair et al. (2019) point out that Cronbach's α is a less precise measure. We found that both Cronbach's α and CR values were above the recommended cut-off values, CR values ranging between 0.807 and 0.928 while Cronbach alpha values ranging between 0.699 and 0.897 (see table 5.2). Hence, we may conclude that our study satisfied the criteria of internal consistency. For convergent validity, we found that AVE values of all the constructs are ranging between 0.518 and 0.763 (see Table 5.2). Thus, our study satisfied the criteria of convergent validity.

.

Table 5.2: Reliability and Validity of Measurement Model

Constructs	Indicator Code	Indicators	Loadings ¹	Cronbach's Alpha ²	CR ³	AVE ⁴
Attitudes (ATT)	ATT1	Recycling plastic waste is good	0.785	0.877	0.906	0.618
	ATT2	Recycling plastic waste is useful	0.818			
	ATT3	Recycling plastic waste is rewarding	0.824			
	ATT4	Recycling plastic waste is sensible	0.854			
	ATT5	Recycling plastic waste would give our organization great satisfaction	0.702			
	ATT6	It is our organization's responsibility to recycle plastic waste	0.723			
Subjective Norms (SUN)	SUN1	Most people who influence our decisions think that our organization should recycle plastic waste	0.830	0.841	0.884	0.605
	SUN2	Most people inside our organization think that our organization should participate in recycling plastic waste.	0.838			
	SUN3	Most people outside our organization think that our organization should participate in recycling plastic waste.	0.773			
	SUN4	Many organizations similar to our organization participate in recycling plastic waste	0.755			
	SUN5	Our neighboring organizations participate in recycling plastic waste	0.684			
Perceived Behavioral Control (PBC)	PBC1	Our organization knows what items of plastic waste can be recycled	0.815	0.772	0.842	0.526
	PBC2	Our organization knows where to take plastic waste for recycling	0.821			
	PBC3	Our organization knows how to recycle plastic waste	0.850			
	PBC4	Whether or not our organization recycles plastic waste is entirely up to us	0.469			
	PBC5	Whether or not our organization recycles plastic waste effectively is completely within our control	0.593			

Intentions (INT)	INT1	Our organization intends to recycle plastic waste	0.859	0.897	0.928	0.763
	INT2	Our organization plans to recycle plastic waste	0.868			
	INT3	Our organization is willing to put efforts to recycle plastic waste	0.896			
	INT4	Our organization is willing to participate or continue plastic recycling	0.869			
Behaviors (BEH)	BEH1	Utilizing eco-friendly packaging	0.621	0.699	0.807	0.518
	BEH2	Segregating plastics from other waste	0.833			
	BEH3	Handing over generated plastic waste to a waste management company	0.817			
	BEH4 ⁵	<i>Selling generated plastic waste to other organizations</i>	N/A ⁶			
	BEH5 ⁵	<i>Reusing generated plastic waste within our organization</i>	N/A ⁶			
	BEH6	Reducing the generation of plastic waste	0.569			
Pressures (PRE)	PRE1	International trade regulations	0.809	0.846	0.886	0.565
	PRE2	EU regulations on plastic recycling	0.843			
	PRE3	Local regulations on plastic recycling	0.734			
	PRE4	Threat of future environmental regulations	0.689			
	PRE5	Green strategies of competitors	0.713			
	PRE6	Environmental awareness of customers	0.708			
Barriers (BAR)	BAR1	Lack of funds for recycling plastic waste	0.724	0.867	0.895	0.519
	BAR2	Lack of enough time to sort plastic waste	0.737			
	BAR3	Lack of skilled personnel to sort plastic waste	0.708			
	BAR4	Lack of enough space to store plastic waste	0.753			
	BAR5	Lack of easy access to recycling facilities	0.810			
	BAR6	Lack of convenient transport to handover plastic waste	0.801			
	BAR7	Lack of an environmental expert at management level	0.604			
	BAR8	Lack of information about potential buyers of plastic waste	0.596			
Enablers (ENA)	ENA1	Government enforcing more strict regulations	0.659	0.852	0.887	0.530
	ENA2	Government providing economic incentives	0.745			
	ENA3	Institutions advising funding possibilities	0.697			
	ENA4	Institutions organizing training programs	0.806			

ENA5	Institutions establishing a networking platform to facilitate selling or reuse of plastic waste	0.800
ENA6	Waste management companies providing necessary guidelines and facilities	0.740
ENA7	Waste management companies providing better quotes or charging an affordable fee	0.632

Note:

1. Indicator Loadings > 0.5 indicates the indicator reliability (Hulland, 1999, p. 198)
2. Cronbach's Alpha > 0.7 indicates the internal consistency of a set of indicators (Nunnally, 1978)
3. Composite Reliability (CR) > 0.7 indicates the internal consistency of a set of indicators (Gefen et al., 2000)
4. Average Variance Extracted (AVE) > 0.5 indicates the convergent reliability (Bagozzi & Yi, 1988; Fornell & Larcker, 1981)
5. These indicators were deleted due to low loadings in order to achieve AVE > 0.5
6. The loadings of BEH4 and BEH5 were respectively 0.475 and 0.476, while the AVE was 0.398 before deleting these indicators

To assess the discriminant validity, we tested the Fornell-Larcker criterion (Fornell & Larcker, 1981) as well as the Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion (Henseler et al., 2015). The Fornell and Larcker criterion stipulates that the square root of the AVE of each construct should be greater than its correlation with other constructs (Chin, 2010). We found that the measurement model satisfied the Fornell-Larcker criterion (see Table 5.3). Henseler et al. (2015) pointed out the Fornell-Larcker criterion may not be sufficient to assess discriminant validity. Therefore, the HTMT criterion should accompany the Fornell-Larcker criterion (Ali et al., 2018). According to Hair et al. (2019), the HTMT value should ideally be less than 0.85, we found that the measurement model also satisfied the HTMT criterion (see Table 5.4). Hence, our study satisfied the criteria of discriminant validity. Also, we checked the variance inflation factor (VIF) of constructs and indicators. We did not find any multicollinearity issue since VIF values of all constructs were less than 3.0 (Hair et al., 2019). In short, the measurement model of our study is appropriate. Thus, we may proceed to evaluate the structural model.

Table 5.3: Discriminant Validity (Fornell-Larcker Criterion)

	ATT	BAR	BEH	ENA	INT	PBC	PRE	SUN
ATT	0.786							
BAR	-0.243	0.721						
BEH	0.320	-0.340	0.719					
ENA	0.279	0.055	0.187	0.728				
INT	0.490	-0.187	0.339	0.243	0.873			
PBC	0.425	-0.393	0.461	0.105	0.476	0.726		
PRE	0.226	-0.013	0.214	0.432	0.154	0.168	0.751	
SUN	0.512	-0.267	0.350	0.226	0.468	0.527	0.290	0.778

Note:

The diagonal values (in bold) are the square root of the AVEs of latent variables and indicates the highest in any column or row.

Table 5.4: Discriminant Validity (HTMT Criterion)

	ATT	BAR	BEH	ENA	INT	PBC	PRE	SUN
ATT	—							
BAR	0.255	—						
BEH	0.366	0.390	—					
ENA	0.313	0.123	0.237	—				
INT	0.517	0.197	0.397	0.268	—			
PBC	0.477	0.433	0.538	0.136	0.554	—		
PRE	0.244	0.083	0.291	0.504	0.161	0.193	—	
SUN	0.530	0.302	0.452	0.256	0.510	0.606	0.328	—

Note:

HTMT < 0.85 is a threshold limit (Hair et al., 2019)

5.4.2. Structural Model

Firstly, we checked the R^2 values, which indicate in-sample predictive power, of the endogenous constructs. The R^2 values for behavioral intentions (INT) and actual behaviors (BEH) were 0.350 and 0.286 respectively which confirmed that the estimations fit the data well. According to Cohen (1992), the R^2 values of 0.02, 0.13, and 0.26 are respectively considered as small, medium, and large. Thus, the R^2 values of behavioral intention (INT) and actual behavior (BEH) indicate that in-sample predictive power is satisfactory. Next, we checked the predictive relevance through Stone-Geisser's Q^2 value using the blindfolding procedure with an omission distance of eight (Ringle et al., 2015). According to Hair et al. (2019), the Q^2 values greater than the values of 0, 0.25, and 0.50 respectively depict small, medium, and large predictive relevance. The Q^2 values of behavioral intention (INT) and actual behavior (BEH) in our study were 0.247 and 0.113 respectively which confirmed the predictive relevance of the structural model. Hair et al. (2017) suggest that the SRMR value should be less than 0.08 to achieve model fit. We found the SRMR value equal to 0.071. Hence, our study satisfied the overall model fit criteria of PLS-SEM.

Finally, we computed the PLS algorithm with bootstrapping to assess path coefficients (standardized beta), significance levels, and t-values (Ringle et al., 2015). We found that the direct effects of attitudes (ATT), subjective norms (SUN), and perceived behavioral control (PBC) on behavioral intentions (INT) respectively have significant values of 0.287, 0.189, and 0.257 (each $p < 0.01$). Thus, hypotheses 1, 2, and 3 are found to be empirically supported (see Table 5.5). The direct effects of behavioral intentions (INT) and perceived behavioral control (PBC) on actual behaviors (BEH) respectively have significant values of 0.120 ($p < 0.05$) and 0.294 ($p < 0.01$). Thus, hypotheses 4 and 5 are found to be empirically supported (see Table 5.5). The direct effects of pressures (PRE), barriers (BAR) and enablers (ENA) on actual behaviors (BEH) respectively have significant values of 0.106 ($p < 0.1$), -0.209 ($p < 0.01$) and 0.098 ($p < 0.1$). Thus, hypotheses 6, 7, and 8 are found to be empirically supported (see Table 5.5).

Table 5.5: Hypothesis Testing (Bootstrapping)

Hypotheses	Relationships	Std Beta	Std Error	t Values	p Values	Findings	95% CI LL	95% CI UL
H1	ATT → INT	0.287	0.041	6.940***	0.000	Supported	0.219	0.355
H2	SUN → INT	0.189	0.043	4.316***	0.000	Supported	0.119	0.261
H3	PBC → INT	0.257	0.043	5.892***	0.000	Supported	0.183	0.327
H4	INT → BEH	0.120	0.043	2.824**	0.004	Supported	0.049	0.190
H5	PBC → BEH	0.294	0.047	6.241***	0.000	Supported	0.214	0.369
H6	PRE → BEH	0.106	0.041	2.513*	0.012	Supported	0.038	0.173
H7	BAR → BEH	-0.209	0.036	5.709***	0.000	Supported	-0.270	-0.150
H8	ENA → BEH	0.098	0.045	2.077*	0.038	Supported	0.025	0.171

Note:

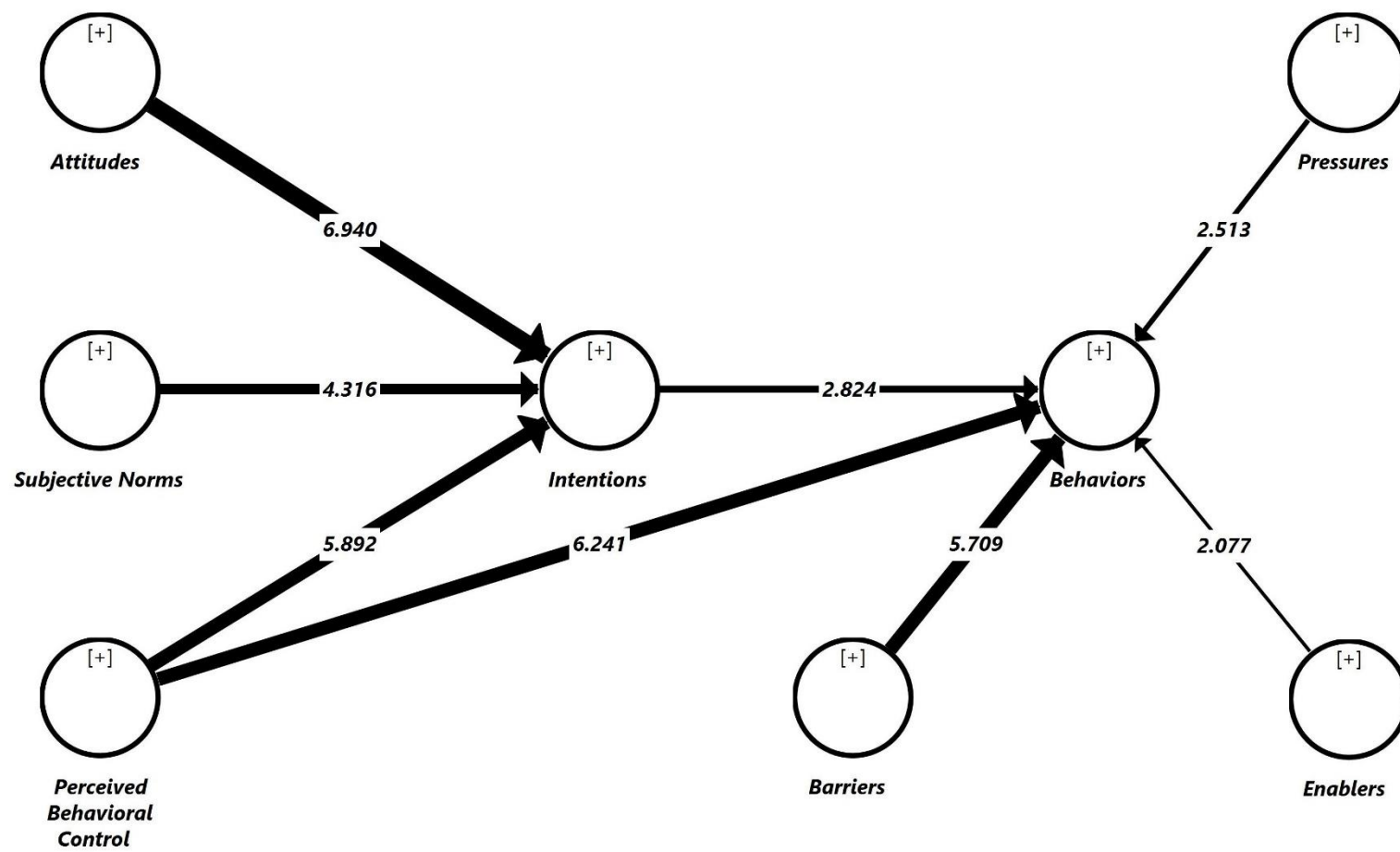
* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$;

The *t* Values around 1.65, 1.96, and 2.58 are considered with the significance level of 10%, 5% and 1%, respectively (Two-Tailed Test)

5.5. Discussion and Implications

We focused on a research gap, that is, the intentions and behaviors of organizations to plastic recycling. On one hand, our study substantiates that both individual-level and organizational-level determinants contribute to the prediction of organizational behavior. On the other hand, our study contributes to research gaps that Yuriev et al. (2020) identified in their meta-analysis on pro-environmental behaviors. We contribute to TPB by measuring both intentions and behaviors which usually most researchers fail to do so, and by incorporating factors to investigate the causes of the intention-behavior gap (Yuriev et al., 2020). Our findings indicate that the attitudes, subjective norms, and perceived behavioral control of decision makers are significant determinants of organizations' intentions to implement best practices of plastic recycling. Furthermore, organizations' intentions are significant determinants of organizations' behaviors towards a circular economy for plastics. In short, our PLS-SEM analysis shows that attitudes are the strongest predictor of organizations' intentions, whereas perceived behavioral control and barriers are the strongest predictors of organizations' behaviors (see Figure 5.3).

Figure 5.3: Summary of Findings



Our study shows that attitudes are a significant determinant of behavioral intentions. This finding is consistent with previous studies (Botetzagias et al., 2015; Cordano & Frieze, 2000; F. Khan, Ahmed, Najmi, et al., 2019; Papagiannakis & Lioukas, 2012; Singh et al., 2018; Thoradeniya et al., 2015). It is worth noting that in our study attitudes yielded the strongest relationship with behavioral intentions as compared to subjective norms and perceived behavioral control. This finding corroborates the finding of previous studies (Ajzen, 1991; Cordano & Frieze, 2000; Papagiannakis & Lioukas, 2012; Singh et al., 2018). In our study, 91% of respondents showed a positive aggregative attitude. Although 83% of respondents agreed that plastic recycling is the responsibility of their organizations, only 76% of respondents agreed that plastic recycling would give great satisfaction to their organizations. This finding suggests that the government should further stimulate the attitudes of decision makers to attain a circular economy for plastics.

Some previous studies found an insignificant relationship between perceived behavioral control and behavioral intentions (Chen & Tung, 2010; Cordano & Frieze, 2000; F. Khan, Ahmed, & Najmi, 2019; Papagiannakis & Lioukas, 2012; Singh et al., 2018). Yet, in our study perceived behavioral control yielded a positive and strong relationship with behavioral intentions. It is worth mentioning that respondents in our study are decision makers who have greater control over organizations' operations than other managers or employees. Therefore, the difference in a sample may explain why some studies, like our study, find a positive and strong relationship between perceived behavioral control and behavioral intentions (Ajzen, 1991; Botetzagias et al., 2015; F. Khan, Ahmed, Najmi, et al., 2019; Thoradeniya et al., 2015), whereas other studies did not find such a relation. In our study, 67% of respondents showed a positive aggregative perceived behavioral control. However, 12% of respondents reported that they do not know how their organizations can contribute to plastic recycling. This finding suggests that the government should further disseminate knowledge, particularly in small size organizations, to attain a circular economy for plastics.

Botetzagias et al. (2015) and Tonglet et al. (2004) found an insignificant relationship between subjective norms and behavioral intentions towards recycling. In contrast, and consistent with many other studies, our study shows that subjective norms are a significant determinant of behavioral intentions (Chen & Tung, 2010; Cordano & Frieze, 2000; F. Khan, Ahmed, & Najmi, 2019; Papagiannakis & Lioukas, 2012; Singh et al., 2018). However, in our study subjective norms yielded a less strong relationship with behavioral intentions compared

to attitudes and perceived behavioral control. It is worth noting that though 52% of respondents agreed that aggregative subjective norms are positive for plastic recycling, yet only 32% of respondents perceive that their neighboring organizations participate in plastic recycling. In contrast, 72% of respondents agreed that most people within their organizations are in favor of participating in plastic recycling. These findings suggest that the government should take appropriate measures to develop momentum, that is, fostering pro-active sociocultural norms towards plastic recycling.

As anticipated that behavioral intentions and perceived behavioral control are significant determinants of actual behaviors (Ajzen, 1985), our PLS-SEM analysis shows that both organizations' intentions and perceived behavioral control yielded a positive and strong relationship with organizations' behaviors towards a circular economy for plastics. In our study, 82% of respondents showed positive aggregative intentions to implement best practices of plastic recycling. Overall, our study substantiates the application of TPB by combining individual-level and organizational-level characteristics (Cordano & Frieze, 2000; F. Khan, Ahmed, & Najmi, 2019; Singh et al., 2018). Previous studies substantiated that institutional pressures influence organizations' behaviors, practices, and environmental strategies (Daddi, Bleischwitz, Todaro, Gusmerotti, & De Giacomo, 2020; Daddi et al., 2016). In line with that, our study shows that pressures are also a significant determinant of organizations' behaviors to plastic recycling. This finding seems to support Singh et al. (2018) who point out that regulatory pressure coupled with positive attitudes positively influences organizations in circular economy adoption. However, this finding may not be generalized since pressures are based on the culture and/or regulations of a respective country (Heidbreder et al., 2019). A majority of respondents perceive that regulatory pressure is stronger than market pressure. For instance, only 38% of respondents agreed that they encounter pressure from their competitors, though 55% of respondents acknowledged that they encounter aggregative pressures for plastic recycling. This finding substantiates that all institutional pressures do not induce the same effect (Daddi et al., 2020).

A circular economy for plastics refers to reducing, reusing, and recycling of plastic waste. Although 82% of respondents showed positive aggregative intentions to implement best practices of plastic recycling. However, our findings show that majority of organizations are mainly involved in practices such as source-separation and handing over plastic waste. In other words, the majority of organizations are not yet involved in practices such as reusing and

reducing plastic waste. Indeed, only 14% and 23% of respondents reported that their organizations are successfully implementing reusing and reducing plastic waste respectively. It implies that the majority of organizations are far away from contributing to a circular economy for plastics. Our study shows that barriers are a significant determinant of organizational behavior. Our PLS-SEM analysis indicates that barriers yielded a very strong (and negative) relationship with organizations' behaviors compared to other constructs. It implies that barriers are the factors that cause the gap between intentions and behaviors of organizations towards a circular economy for plastics.

These barriers in order of importance are as follows. The foremost barrier is that organizations do not have easy access to recycling facilities. Second, organizations cannot transport plastic waste to recycling facilities. Third, organizations do not have enough space to store plastic waste. Fourth, organizations do not have enough time to sort plastic waste. Fifth, organizations do not have sufficient funds to pursue plastic recycling. Sixth, organizations do not have skilled personnel to sort plastic waste. Seventh, organizations do not have an environmental expert at the management level. Lastly, organizations do not know about potential buyers of plastic waste. These findings imply that prominent barriers are physical factors rather than knowledge. Overall, these findings contribute to the literature on the barriers of a circular economy (Liu & Bai, 2014; Ormazabal et al., 2018; Ritzén & Sandström, 2017).

Our study shows that enablers are just a slightly significant determinant of organizational behavior. Our PLS-SEM analysis indicates that enablers yielded a moderately strong (and positive) relationship with organizations' behaviors. It implies that the confluence of pressures and enablers may compensate (or overcome) the aforementioned barriers. These enablers in order of importance are as follows. The foremost enabler is that government or relevant institutions should organize training programs. Second, government or relevant institutions should establish a networking platform to facilitate selling or reusing plastic waste. Third, the government should provide economic incentives. Fourth, waste management companies should provide the necessary guidelines and facilities to organizations. Fifth, relevant institutions should advise funding possibilities. Sixth, the government should enforce more strict regulations. Lastly, waste management companies should provide better quotes or charge an affordable fee from organizations. In short, our study indicates that if the aforementioned actions are implemented then organizations may enthusiastically contribute to a circular economy for plastics.

5.6. Conclusion

The main objective of our study was to empirically assess the determinants of intentions and behaviors of organizations towards a circular economy for plastics. We found that though most decision makers or organizations have positive intentions to implement best practices of plastic recycling, yet most organizations seem to be failing in implementing best practices of plastic recycling. This intention-behavior gap mainly occurs due to the aforementioned barriers. Nevertheless, we conclude that the confluence of pressures and enablers may compensate (or overcome) the aforementioned barriers. Therefore, to overcome the aforementioned intention-behavior gap and to attain a circular economy for plastics, the government or relevant institutions should aim to facilitate organizations by taking appropriate measures such as the aforementioned enablers. Moreover, the government should stimulate attitude and/or enhance perceived behavioral control of corporate decision makers. The government may do so by providing incentives, disseminating knowledge, and creating networking platforms for collaboration among decision makers.

Our study, besides its merits, has some limitations. Previous studies on recycling suggest the inclusion of moral norms in the TPB model (Botetzagias et al., 2015; Chen & Tung, 2010; Tonglet et al., 2004). However, our study did not consider moral norms. Unlike previous studies (Thoradeniya et al., 2015), our study did not assess indirect determinants (antecedents of ATT, SUN, and PBC) such as behavioral, normative, and control beliefs (Ajzen, 1991). We assessed only direct determinants since we wanted to focus on the intention-behavior gap. If we had added questions related to moral norms and indirect determinants, then it would have made the questionnaire too long. We followed the recommended guidelines to ensure the quality of the data. However, social desirability bias which is commonly found in surveys could not be ruled out. In other words, the respondents' perceptions may not coincide with the objective and rational reality. We measured the behaviors of organizations through their self-reported data. Our study is cross-sectional. Moreover, our study is limited to the sample size of 637 organizations, and the survey was conducted in Belgium. Therefore, the findings of our study may only be generalized to other countries with caution. We wanted to get data from more organizations, but we could not do so. We had to close our survey considering a lack of responsiveness from organizations after the COVID-19 pandemic.

Our study suggests some opportunities for future research too. For instance, a similar study could be replicated in other countries to get more valuable insights. Future studies may also investigate whether or not pressures, barriers, and enablers moderate the relationship between organizations' intentions and organizations' behaviors. Lastly, future studies may conduct a qualitative or longitudinal study to better understand the intentions and behaviors of organizations towards a circular economy for plastics.

CHAPTER 6

Conclusion of the Dissertation

6.1. Overview

Scholars and practitioners have been strongly advocating that CE is a necessity to sustain and improve human life (Deloitte Sustainability, 2016). Though slowly but now organizations have been realizing that CE is indeed vital for the viability and sustainability of their business too. There is no doubt that many organizations are keen to adopt CE considering its potential benefits. The problem is that despite the increasing popularity of CE and various initiatives from the EU and national governments, organizations are not yet easily able to translate this concept into their corporate strategies, business models, and operations (Geng & Doberstein, 2008; Ormazabal et al., 2018).

Even though in recent years there is an increasing interest of organizations to adopt CE, the existing literature on CE regarding the practical guidance and management know-how is still in its infancy (Urbinati et al., 2017). In other words, the tools and methodologies mentioned in the grey literature are too generic and insufficient for an organization to adopt CE. To the best of our knowledge, there is still no or very little academic discussion on how organizations can implement CE. In this context, the present dissertation attempted to explain (and propose a framework) how organizations that are willing to adopt CE may do so.

Overall, the present dissertation concludes that organizations can accomplish CE through their dynamic capabilities. Therefore, we unequivocally suggest that organizations should develop and apply dynamic capabilities for their CE objectives. This would also consequently improve their overall performance. On the other hand, behavioral change among decision makers of organizations is also necessary for the transition towards CE. For this purpose, policymakers may consider the presented suggestions.

6.2. Concluding Remarks

6.2.1. A Brief Roadmap for CE Implementation

How organizations can identify and pursue CE opportunities?

The present dissertation concludes that sensing, seizing, and reconfiguring is a sequential process through which organizations can accomplish CE. We noted that

organizations should develop and apply four microfoundations of sensing, namely (1) market monitoring and technology scanning, (2) idea generation, (3) knowledge creation, and (4) experiential learning, to identify CE opportunities. Once a CE opportunity is sensed, organizations may address that opportunity through three microfoundations of seizing, namely (1) strategic planning, (2) business model and governance, and (3) collaboration, and four microfoundations of reconfiguring, namely (1) organizational restructuring, (2) technological upgradation, (3) knowledge integration, and (4) best practices adaptation.

The present dissertation concludes that conventional microfoundations of sensing, that is, identification of customer needs, tracking new market trends, analyzing competitors' actions, observing technological developments, involving customers or suppliers in the product development process, and undertaking R&D, play a pivotal role in identifying new opportunities. Therefore, we suggest that organizations must incorporate these microfoundations into their day-to-day operations. Moreover, organizations, particularly manufacturing organizations, should incorporate LCA, which may play a complementary role in R&D. We noted that LCA is an essential tool or prime source for sensing a CE opportunity. Hence, owners or managers of organizations seeking CE opportunities should increase LCA skills among employees to improve the sensing capacity of their organizations. On the other hand, the government may also provide incentives to organizations for LCA adoption.

The present dissertation concludes that R&D is a crucial dynamic capability for developing new knowledge and/or sensing CE opportunities. However, R&D aimed at radical innovation often needs substantial investment. Therefore, organizations, most importantly SMEs, should develop the capabilities of networking and collaboration. We suggest that organizations should collaborate with research institutions to exploit their knowledge in line with CE objectives. We noted that the dynamic capabilities of organizations to collaborate with multiple actors and partners and to effectively manage such collaborations are highly valuable not only for sensing a CE opportunity but also for seizing that opportunity. There is no doubt that the role of top management in developing strategies and managing such collaborations is pivotal.

We noted that CE requires technological innovation as well as management innovation. Organizational restructuring and technological upgradation are crucial dynamic capabilities for CE implementation. Therefore, to support both structural and technological changes,

organizations should adjust their human resources and provide necessary training to employees. We suggest that organizations, aiming to pursue CE opportunities, should clearly define CE objectives, allocate human and financial resources, and involve all top managers and stakeholders to contribute to those objectives. On the other side, the government should positively influence the perception of top managers and entrepreneurs regarding CE to stimulate their commitment toward CE actions. The government may do so by introducing policy actions such as tax breaks or regulatory relief.

6.2.2. Key Capabilities and Organizational Routines

Which are the key capabilities and organizational routines for CE?

The present dissertation concludes that reconfiguring capabilities are more important for CE implementation compared to sensing and seizing capabilities. Furthermore, the performance of sensing capabilities is slightly better compared to reconfiguring capabilities. However, we cannot rule out a possibility that for some organizations sensing capabilities could be more important while for other organizations seizing or reconfiguring capabilities could be more important. We can say that the importance of each dynamic capability is dependent on the specific objective of an organization. We noted that market monitoring and technology scanning, knowledge creation, strategic planning, collaboration, technological upgradation, and best practices adaption are the prominent microfoundations of sensing, seizing, and reconfiguring respectively.

To identify a CE opportunity, the most important capabilities and organizational routines include tracking new market trends (SEN-MT2), observing technological developments (SEN-MT4), involving customers/suppliers in the product development process (SEN-IG2), undertaking R&D to try out new ideas (SEN-KC2), and assessment of potential environmental impacts of products/processes (SEN-EL1). However, in terms of performance, identification of customer needs (SEN-MT1) is slightly better compared to SEN-MT2. It is worth noting that R&D to create new knowledge for developing new products/processes (SEN-KC1) is much better than SEN-KC2 in terms of performance. Interestingly, SEN-MT4, SEN-IG2, and SEN-EL1 hold their performance in line with their importance.

To address an identified CE opportunity, the most important capabilities and organizational routines include planning investments (SEI-SP3), finding strategic partners (SEI-SP2), restructuring of governance structure (SEI-BG2), collaboration to acquire requisite materials (SEI-CO2). However, in terms of performance, planning human resources (SEI-SP5) and strategy formulation (SEI-SP1) are slightly better compared to SEI-SP2 and SEI-SP3. Similarly, the redesigning of business models (SEI-BG1) compared to SEI-BG2 and interdepartmental cooperation (SEI-CO3) compared to SEI-CO2 are slightly better. Finally, the most important reconfiguring actions include organizational structure changes (REC-OR2), new technology introduction (REC-TU2), training of employees (REC-KI1), and adoption of new business practices (REC-BP1). However, mergers or acquisitions (REC-OR1) compared to REC-OR2 and modifications in existing technology (REC-TU1) compared to REC-TU2 are slightly better. Interestingly, REC-KI1 and REC-BP1 hold their performance in line with their importance.

6.2.3. Circular Dynamic Environment, Dynamic Capabilities, CE Implementation, and Overall Performance

Do dynamic capabilities and CE implementation improve the overall performance of organizations? And do the circular dynamic environment influence CE implementation?

The present dissertation concludes that dynamic capabilities and their underlying organizational activities significantly facilitate CE implementation, which consequently improves the overall performance of organizations. We hope this conclusion on the relationship between dynamic capabilities and CE implementation might mitigate negative perceptions (if any) and thereby organizations would take strategic actions for CE implementation more enthusiastically (Gusmerotti et al., 2019). We noted that CE implementation has a positive and significant relationship with the overall performance of organizations. Put differently, CE implementation does not only improve environmental and financial performance but also competitiveness and corporate reputation.

It is worth mentioning that environmental performance is the first and foremost aspect that an organization may expect to be improved. On the other hand, generally speaking, financial performance (in a short-term scenario) is the last aspect that an organization may

expect to be improved. An obvious reason for this is that return on investments takes time and depends on various factors too. Although we noted that financial performance was least improved compared to environmental performance, competitiveness, and corporate reputation. This may not be considered a conclusive conclusion, and indeed the above-mentioned sequence may vary from one organization to another organization. We can say that some organizations could enjoy more financial benefits than others even in a short-term scenario. Nevertheless, CE certainly provides a long-term competitive advantage. Therefore, organizations must strive for CE implementation.

The present dissertation cautiously concludes that a circular dynamic environment may positively influence the transition towards CE. We noted that a circular dynamic environment has a positive and significant relationship with both dynamic capabilities and CE implementation. In light of the above, we can say that the ongoing momentum, that is, push by the EU and several national governments for CE, should be further accelerated. Here, it is worth noting that the effect of a circular dynamic environment on organizations may not necessarily be the same in every country. Furthermore, organizations in developing countries may perceive a circular dynamic environment in a negative sense a threat to their business.

6.2.4. Influencing Factors of CE for Plastics

What factors cause the intention-behavior gap? and how organizations can attain a CE for plastics?

The present dissertation concludes that both individual-level and organizational-level determinants contribute to the prediction of organizational behavior. We noted that the attitudes, subjective norms, and perceived behavioral control of decision makers are significant determinants of organizations' intentions to implement best practices of plastic recycling. Furthermore, organizations' intentions are significant determinants of organizations' behaviors towards a CE for plastics. In short, attitudes are the strongest predictor of organizations' intentions, whereas perceived behavioral control and barriers are the strongest predictors of organizations' behaviors.

We found that though the majority of organizations have a positive attitude towards CE. However, they are simply acting on practices such as source-separation and handing over

plastic waste. The majority of organizations are not yet acting on practices such as reusing and reducing plastic waste. Hence, we may say that majority of organizations are still far away from contributing to CE for plastics. We noted that there are various factors (barriers) that cause the gap between intentions and behaviors of organizations towards CE for plastics. These barriers in order of importance are as follows. The foremost barrier is that organizations do not have easy access to recycling facilities. Second, organizations cannot transport plastic waste to recycling facilities. Third, organizations do not have enough space to store plastic waste. Fourth, organizations do not have enough time to sort plastic waste. Fifth, organizations do not have sufficient funds to pursue plastic recycling. Sixth, organizations do not have skilled personnel to sort plastic waste. Seventh, organizations do not have an environmental expert at the management level. Lastly, organizations do not know about potential buyers of plastic waste.

The present dissertation concludes that the confluence of pressures and enablers may compensate (or overcome) the aforementioned barriers. These enablers in order of importance are as follows. The foremost enabler is that government or relevant institutions should organize training programs. Second, government or relevant institutions should establish a networking platform to facilitate selling or reusing plastic waste. Third, the government should provide economic incentives. Fourth, waste management companies should provide the necessary guidelines and facilities to organizations. Fifth, relevant institutions should advise funding possibilities. Sixth, the government should enforce more strict regulations. Lastly, waste management companies should provide better quotes or charge an affordable fee from organizations. In short, we may assume that if the above-mentioned actions are implemented then organizations may enthusiastically contribute to CE for plastics

6.3. Limitations and Directions for Future Research

The present dissertation has several limitations. The present dissertation developed the presented framework (microfoundations of dynamic capabilities) through only one qualitative study (chapter 2) which was conducted in Italy. We perceive that if we had conducted an additional qualitative study either in Belgium or any other EU country, then we could have found more valuable insights, and thus we could have developed a more generic and rigorous framework. In this way, we could also have detected whether there are any commonalities between the dynamic capabilities of organizations in Italy and the dynamic capabilities of

organizations either in Belgium or any other EU country (Eisenhardt & Martin, 2000). The presented qualitative study is just based on the data of 4 cases while the interviews were conducted only with the top management of case firms. It is obvious that CE implementation is a complex process and the role of every department (or employees) is crucial. We believe that managers (or employees) from the departments such as R&D, production, human resources, finance, and procurement could provide additional insights. If we also had interviewed them, then we could have explained more managerial implications. Unfortunately, we could not interview managers (or employees) from such departments nor we could include additional cases for various reasons such as lack of response from organizations, lack of time, and unavailability of data.

The present dissertation is based on one qualitative study (chapter 2) and three quantitative studies (chapter 3, chapter 4, and chapter 5). There is no perfect research design or methodology. In other words, every research design or methodology has its own pros and cons. Hence, a research method should be carefully selected and appropriate mitigation measures for its cons should also be taken. In the present dissertation, two quantitative studies (chapter 3 and chapter 4) are based on the data obtained through a survey in Italy, while one quantitative study (chapter 5) is based on the data obtained through a survey in Belgium. Although we followed the recommended guidelines to ensure the quality of the data, social desirability bias which is commonly found in surveys could not be ruled out. In other words, the respondents' perceptions in the presented studies may not coincide with the objective and rational reality. The two quantitative studies related to dynamic capabilities (chapter 3 and chapter 4) were organized in Italy and focused only on the manufacturing sector. Therefore, the findings of these two presented studies may only be generalized to other countries and/or sectors with caution. The quantitative study related to behavioral practices (chapter 5) was organized in Belgium and covered various sectors. Therefore, the findings of this study may be generalized to other countries with caution.

The two quantitative studies (chapter 3 and chapter 4) measured the level of CE implementation and the overall performance of organizations through their self-reported data which is another usual limitation of surveys. There is still no established approach (nor scales are available), to measure the concepts such as the dynamic capabilities, level of CE implementation, and overall performance of organizations. If we could have somehow verified the actual performance of organizations through other sources, then we could have further

strengthened the reliability of our conclusions. We think that if we had collected the data for dynamic capabilities on one occasion from one manager, and then the data for performance on another occasion (supposedly after some months) from another manager of the same organization, so we could have mitigated bias (if any). The quantitative study (chapter 5) did not include the variable moral norms in the TPB model, while the previous studies on recycling behavior suggest doing so (Botetzagias et al., 2015). Unlike previous studies (Thoradeniya et al., 2015), the presented study also did not assess indirect determinants (antecedents of attitude, subjective norms, and perceived behavioral control) such as behavioral, normative, and control beliefs (Ajzen, 1991). The presented study assessed only direct determinants since we wanted to focus on the intention-behavior gap. If we had added questions related to moral norms and indirect determinants, then it would have made the questionnaire too long and there could be a risk of low response rate.

The present dissertation provides directions for future research too. Future studies may explore what dynamic capabilities are needed for industry 4.0? How manufacturing organizations may develop and apply dynamic capabilities for industry 4.0? Future studies may also extend the research of the present dissertation in the context of developing countries. It would be valuable to investigate how organizations in developing countries may transition towards CE. Can dynamic capabilities facilitate organizations in CE implementation in a developing country, where there is no circular dynamic environment or regulatory push to implement CE practices? Future studies may organize a retrospective longitudinal study to explore the evolution of dynamic capabilities. Future studies may investigate the microfoundations of dynamic capabilities in other contexts and compare how they differ from the microfoundations of dynamic capabilities presented in the present dissertation. It would be interesting to test whether the presented framework can be used to identify and pursue objectives other than CE. Also, it might be interesting to analyze whether the proposed hypotheses (results) of the present dissertation deviate in a different research setting. Finally, future studies may conduct a longitudinal study to better understand the intentions and behaviors of organizations towards a CE.

REFERENCES

- Abdulrahman, M. D., Gunasekaran, A., & Subramanian, N. (2014). Critical barriers in implementing reverse logistics in the Chinese manufacturing sectors. *International Journal of Production Economics*. <https://doi.org/10.1016/j.ijpe.2012.08.003>
- Accenture. (2014). *Circular Advantage: Innovative Business Models and Technologies to Create Value in a World without Limits to Growth*.
- Adner, R., & Helfat, C. E. (2003). Corporate effects and dynamic managerial capabilities. *Strategic Management Journal*, 24(10), 1011–1025. <https://doi.org/10.1002/smj.331>
- Agarwal, R., & Helfat, C. E. (2009). Strategic Renewal of Organizations. *Organization Science*, 20(2), 281–293. <https://doi.org/10.1287/orsc.1090.0423>
- Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In *Action Control* (pp. 11–39). https://doi.org/10.1007/978-3-642-69746-3_2
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Albort-Morant, G., Leal-Rodríguez, A. L., Fernández-Rodríguez, V., & Ariza-Montes, A. (2018). Assessing the origins, evolution and prospects of the literature on dynamic capabilities: A bibliometric analysis. *European Research on Management and Business Economics*, 24(1), 42–52. <https://doi.org/10.1016/j.iedeen.2017.06.004>
- Ali, F., Rasoolimanesh, S. M., Sarstedt, M., Ringle, C. M., & Ryu, K. (2018). An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research. *International Journal of Contemporary Hospitality Management*, 30(1), 514–538. <https://doi.org/10.1108/IJCHM-10-2016-0568>
- Ambrosini, V., & Bowman, C. (2009). What are dynamic capabilities and are they a useful construct in strategic management? *International Journal of Management Reviews*. <https://doi.org/10.1111/j.1468-2370.2008.00251.x>
- Amui, L. B. L., Jabbour, C. J. C., de Sousa Jabbour, A. B. L., & Kannan, D. (2017). Sustainability as a dynamic organizational capability: a systematic review and a future agenda toward a sustainable transition. *Journal of Cleaner Production*, 142, 308–322. <https://doi.org/10.1016/j.jclepro.2016.07.103>
- Annunziata, E., Pucci, T., Frey, M., & Zanni, L. (2018). The role of organizational capabilities in attaining corporate sustainability practices and economic performance: Evidence from Italian wine industry. *Journal of Cleaner Production*, 171, 1300–1311. <https://doi.org/10.1016/j.jclepro.2017.10.035>

- Aragón-Correa, J. A., & Sharma, S. (2003). A contingent resource-based view of proactive corporate environmental strategy. *Academy of Management Review*, 28(1), 71–88. <https://doi.org/10.5465/amr.2003.8925233>
- Arend, R. J. (2014). Social and Environmental Performance at SMEs: Considering Motivations, Capabilities, and Instrumentalism. *Journal of Business Ethics*, 125(4), 541–561. <https://doi.org/10.1007/s10551-013-1934-5>
- Bag, S., Gupta, S., & Foropon, C. (2019). Examining the role of dynamic remanufacturing capability on supply chain resilience in circular economy. *Management Decision*, 57(4), 863–885. <https://doi.org/10.1108/MD-07-2018-0724>
- Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16(1), 74–94. <https://doi.org/10.1007/BF02723327>
- Bagur-Femenias, L., Llach, J., & del Mar Alonso-Almeida, M. (2013). Is the adoption of environmental practices a strategic decision for small service companies? *Management Decision*, 51(1), 41–62. <https://doi.org/10.1108/00251741311291300>
- Bansal, P. (2005). Evolving sustainably: a longitudinal study of corporate sustainable development. *Strategic Management Journal*, 26(3), 197–218. <https://doi.org/10.1002/smj.441>
- Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Barreto, I. (2010). Dynamic Capabilities: A Review of Past Research and an Agenda for the Future. *Journal of Management*, 36(1), 256–280. <https://doi.org/10.1177/0149206309350776>
- Becker, J.-M., Klein, K., & Wetzels, M. (2012). Hierarchical Latent Variable Models in PLS-SEM: Guidelines for Using Reflective-Formative Type Models. *Long Range Planning*, 45(5–6), 359–394. <https://doi.org/10.1016/j.lrp.2012.10.001>
- Bhupendra, K. V., & Sangle, S. (2015). What drives successful implementation of pollution prevention and cleaner technology strategy? The role of innovative capability. *Journal of Environmental Management*, 155, 184–192. <https://doi.org/10.1016/J.JENVMAN.2015.03.032>
- Bocken, N. M. P., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33(5), 308–320. <https://doi.org/10.1080/21681015.2016.1172124>
- Boldero, J. (1995). The Prediction of Household Recycling of Newspapers: The Role of Attitudes, Intentions, and Situational Factors¹. *Journal of Applied Social Psychology*,

- 25(5), 440–462. <https://doi.org/10.1111/j.1559-1816.1995.tb01598.x>
- Bos-Brouwers, H. E. J. (2009). Corporate sustainability and innovation in SMEs: evidence of themes and activities in practice. *Business Strategy and the Environment*, n/a-n/a. <https://doi.org/10.1002/bse.652>
- Botetzagias, I., Dima, A. F., & Malesios, C. (2015). Extending the Theory of Planned Behavior in the context of recycling: The role of moral norms and of demographic predictors. *Resources, Conservation and Recycling*. <https://doi.org/10.1016/j.resconrec.2014.12.004>
- Breznik, L., & Lahovnik, M. (2016). Dynamic capabilities and competitive advantage: Findings from case studies. *Journal of Contemporary Management Issues*, 21(Special Issue), 167–185.
- Carter, C. R., & Carter, J. R. (1998). Interorganizational Determinants of Environmental Purchasing: Initial Evidence from the Consumer Products Industries. *Decision Sciences*. <https://doi.org/10.1111/j.1540-5915.1998.tb01358.x>
- Chakrabarty, S., & Wang, L. (2012). The Long-Term Sustenance of Sustainability Practices in MNCs: A Dynamic Capabilities Perspective of the Role of R&D and Internationalization. *Journal of Business Ethics*, 110(2), 205–217. <https://doi.org/10.2307/41684025>
- Chen, M.-F., & Tung, P.-J. (2010). The Moderating Effect of Perceived Lack of Facilities on Consumers' Recycling Intentions. *Environment and Behavior*, 42(6), 824–844. <https://doi.org/10.1177/0013916509352833>
- Chin, W. W. (2010). How to Write Up and Report PLS Analyses. In *Handbook of Partial Least Squares* (pp. 655–690). https://doi.org/10.1007/978-3-540-32827-8_29
- Churchill, G. A. (1979). A Paradigm for Developing Better Measures of Marketing Constructs. *Journal of Marketing Research*, 16(1), 64. <https://doi.org/10.2307/3150876>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155–159. <https://doi.org/10.1037/0033-2909.112.1.155>
- Cordano, M., & Frieze, I. H. (2000). Pollution Reduction Preferences of U.S. Environmental Managers: Applying Ajzen's Theory of Planned Behavior. *Academy of Management Journal*, 43(4), 627–641. <https://doi.org/10.5465/1556358>
- Daddi, T., Bleischwitz, R., Todaro, N. M., Gusmerotti, N. M., & De Giacomo, M. R. (2020). The influence of institutional pressures on climate mitigation and adaptation strategies.

- Journal of Cleaner Production*, 244, 118879.
<https://doi.org/10.1016/j.jclepro.2019.118879>
- Daddi, T., Ceglia, D., Bianchi, G., & de Barcellos, M. D. (2019). Paradoxical tensions and corporate sustainability: A focus on circular economy business cases. *Corporate Social Responsibility and Environmental Management*. <https://doi.org/10.1002/csr.1719>
- Daddi, T., Magistrelli, M., Frey, M., & Iraldo, F. (2011). Do environmental management systems improve environmental performance? Empirical evidence from Italian companies. *Environment, Development and Sustainability*, 13(5), 845–862.
<https://doi.org/10.1007/s10668-011-9294-8>
- Daddi, T., Nucci, B., & Iraldo, F. (2017). Using Life Cycle Assessment (LCA) to measure the environmental benefits of industrial symbiosis in an industrial cluster of SMEs. *Journal of Cleaner Production*, 147, 157–164. <https://doi.org/10.1016/j.jclepro.2017.01.090>
- Daddi, T., Testa, F., Frey, M., & Iraldo, F. (2016). Exploring the link between institutional pressures and environmental management systems effectiveness: An empirical study. *Journal of Environmental Management*, 183, 647–656.
<https://doi.org/10.1016/j.jenvman.2016.09.025>
- Daddi, T., Todaro, N. M., De Giacomo, M. R., & Frey, M. (2018). A Systematic Review of the Use of Organization and Management Theories in Climate Change Studies. *Business Strategy and the Environment*, 27(4), 456–474. <https://doi.org/10.1002/bse.2015>
- Dangelico, R. M., & Pujari, D. (2010). Mainstreaming Green Product Innovation: Why and How Companies Integrate Environmental Sustainability. *Journal of Business Ethics*, 95(3), 471–486. <https://doi.org/10.1007/s10551-010-0434-0>
- Davis, G., Phillips, P. S., Read, A. D., & Iida, Y. (2006). Demonstrating the need for the development of internal research capacity: Understanding recycling participation using the Theory of Planned Behaviour in West Oxfordshire, UK. *Resources, Conservation and Recycling*. <https://doi.org/10.1016/j.resconrec.2005.07.001>
- De Marchi, V. (2012). Environmental innovation and R&D cooperation: Empirical evidence from Spanish manufacturing firms. *Research Policy*, 41(3), 614–623.
<https://doi.org/10.1016/j.respol.2011.10.002>
- De Meester, S. (2013). *Life Cycle Assessment in biorefineries: case studies and methodological development*. Ghent University.
- Deloitte. (2017). *Blueprint for plastics packaging waste: Quality sorting and recycling*. Retrieved from
<https://www2.deloitte.com/content/dam/Deloitte/my/Documents/risk/my-risk-blueprint->

- plastics-packaging-waste-2017.pdf
- Deloitte Sustainability. (2016). *Circular economy potential for climate change mitigation*.
- Dess, G. G., & Beard, D. W. (1984). Dimensions of Organizational Task Environments. *Administrative Science Quarterly*. <https://doi.org/10.2307/2393080>
- Drnevich, P. L., & Kriauciunas, A. P. (2011). Clarifying the conditions and limits of the contributions of ordinary and dynamic capabilities to relative firm performance. *Strategic Management Journal*. <https://doi.org/10.1002/smj.882>
- Economiacircolare. (2019). The Italian Atlas of Circular Economy. Retrieved from <https://www.economiacircolare.com/latlante/>
- Eikelenboom, M., & de Jong, G. (2019). The impact of dynamic capabilities on the sustainability performance of SMEs. *Journal of Cleaner Production*, 235, 1360–1370. <https://doi.org/10.1016/j.jclepro.2019.07.013>
- Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *Academy of Management Review*, 14(4), 532–550. <https://doi.org/10.5465/amr.1989.4308385>
- Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they? *Strategic Management Journal*, 21(10–11), 1105–1121. [https://doi.org/10.1002/1097-0266\(200010/11\)21:10/11<1105::AID-SMJ133>3.0.CO;2-E](https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E)
- Ellen MacArthur Foundation. (2013). *Towards the Circular Economy: Economic and business rationale for an accelerated transition*. Retrieved from <https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf>
- Ellen MacArthur Foundation. (2015). *Towards a Circular Economy: Business rationale for an accelerated transition*. Retrieved from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/TCE_Ellen-MacArthur-Foundation_26-Nov-2015.pdf
- Ellen MacArthur Foundation. (2017). *The New Plastics Economy: Rethinking the future of plastics & catalysing action*. Retrieved from <https://www.ellenmacarthurfoundation.org/publications/the-new-plastics-economy-rethinking-the-future-of-plastics-catalysing-action>
- Eriksson, T. (2013). Methodological issues in dynamic capabilities research - a critical review. *Baltic Journal of Management*, 8(3), 306–327. <https://doi.org/10.1108/BJOM-Jul-2011-0072>
- EU. Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste. , (2018).

- European Commission. (2016). *Flash Eurobarometer 441: European SMEs and the Circular Economy*. Retrieved from https://ec.europa.eu/environment/green-growth/docs/fl_441_sum_en.pdf
- European Commission. (2018). *A European Strategy for Plastics in a Circular Economy*. Retrieved from <https://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy-brochure.pdf>
- European Parliament. (2018a). Circular economy: definition, importance and benefits. Retrieved September 25, 2020, from <https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>
- European Parliament. (2018b). Plastic waste and recycling in the EU: facts and figures. Retrieved March 15, 2020, from <https://www.europarl.europa.eu/news/en/headlines/society/20181212STO21610/plastic-waste-and-recycling-in-the-eu-facts-and-figures>
- Eurostat. (2014). The Community Innovation Survey (CIS) - The Harmonized Survey Questionnaire. Retrieved May 1, 2019, from <https://ec.europa.eu/eurostat/web/microdata/community-innovation-survey>
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Fishbein, M., & Ajzen, I. (2011). *Predicting and Changing Behavior: The Reasoned Action Approach*. Taylor & Francis.
- Flannery, B. L., & May, D. R. (2000). Environmental ethical decision making in the U.S. metal-finishing industry. *Academy of Management Journal*. <https://doi.org/10.2307/1556359>
- Folk, E. (2018). Environmental Impacts of Industrialization. Retrieved September 20, 2020, from <https://www.ecomena.org/environmental-impacts-of-industrialization/>
- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39. <https://doi.org/10.2307/3151312>
- Gefen, D., Straub, D., & Boudreau, M.-C. (2000). Structural Equation Modeling and Regression: Guidelines for Research Practice. *Communications of the Association for Information Systems*. <https://doi.org/10.17705/1cais.00407>
- Geiger, J. L., Steg, L., van der Werff, E., & Ünal, A. B. (2019). A meta-analysis of factors related to recycling. *Journal of Environmental Psychology*, 64, 78–97.

- <https://doi.org/10.1016/j.jenvp.2019.05.004>
- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768. <https://doi.org/10.1016/j.jclepro.2016.12.048>
- Geng, Y., & Doberstein, B. (2008). Developing the circular economy in China: Challenges and opportunities for achieving “leapfrog development.” *International Journal of Sustainable Development & World Ecology*, 15(3), 231–239. <https://doi.org/10.3843/SusDev.15.3:6>
- Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*. <https://doi.org/10.1126/sciadv.1700782>
- Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production*, 114, 11–32. <https://doi.org/10.1016/j.jclepro.2015.09.007>
- Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2012). Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods*, 16(1), 15–31. <https://doi.org/10.1177/1094428112452151>
- Girod, S. J. G., & Whittington, R. (2017). Reconfiguration, restructuring and firm performance: Dynamic capabilities and environmental dynamism. *Strategic Management Journal*. <https://doi.org/10.1002/smj.2543>
- Global Footprint Network. (2018). Ecological Footprint. Retrieved August 20, 2018, from Ecological Footprint website: <https://www.footprintnetwork.org/our-work/ecological-footprint/>
- Griffith, D. A., & Harvey, M. G. (2001). A resource perspective of global dynamic capabilities. *Journal of International Business Studies*. <https://doi.org/10.1057/palgrave.jibs.8490987>
- Gusmerotti, N. M., Testa, F., Corsini, F., Pretner, G., & Iraldo, F. (2019). Drivers and approaches to the circular economy in manufacturing firms. *Journal of Cleaner Production*, 230, 314–327. <https://doi.org/10.1016/J.JCLEPRO.2019.05.044>
- Haas, W., Krausmann, F., Wiedenhofer, D., & Heinz, M. (2015). How circular is the global economy?: An assessment of material flows, waste production, and recycling in the European union and the world in 2005. *Journal of Industrial Ecology*. <https://doi.org/10.1111/jiec.12244>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. (2nd ed.). Thousand Oaks, CA:

- Sage.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–152. <https://doi.org/10.2753/MTP1069-6679190202>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Hair, J. F., Sarstedt, M., Pieper, T. M., & Ringle, C. M. (2012). The Use of Partial Least Squares Structural Equation Modeling in Strategic Management Research: A Review of Past Practices and Recommendations for Future Applications. *Long Range Planning*, 45(5–6), 320–340. <https://doi.org/10.1016/j.lrp.2012.09.008>
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, 40(3), 414–433. <https://doi.org/10.1007/s11747-011-0261-6>
- Hart, S. L. (1995). A Natural-Resource-Based View of the Firm. *The Academy of Management Review*, 20(4), 986–1014. <https://doi.org/10.2307/258963>
- Heidbreder, L. M., Bablok, I., Drews, S., & Menzel, C. (2019). Tackling the plastic problem: A review on perceptions, behaviors, and interventions. *Science of the Total Environment*. <https://doi.org/10.1016/j.scitotenv.2019.02.437>
- Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D., & Winter, S. G. (2007). *Dynamic Capabilities: Understanding Strategic Change in Organizations*. Oxford: Blackwell Publishing.
- Helfat, C. E., & Martin, J. A. (2015). Dynamic Managerial Capabilities: Review and Assessment of Managerial Impact on Strategic Change. *Journal of Management*. <https://doi.org/10.1177/0149206314561301>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In *Advances in International Marketing* (pp. 277–319). [https://doi.org/10.1108/S1474-7979\(2009\)0000020014](https://doi.org/10.1108/S1474-7979(2009)0000020014)
- Hofmann, K. H., Theyel, G., & Wood, C. H. (2012). Identifying Firm Capabilities as Drivers of Environmental Management and Sustainability Practices - Evidence from Small and

- Medium-Sized Manufacturers. *Business Strategy and the Environment*.
<https://doi.org/10.1002/bse.739>
- Homrich, A. S., Galvão, G., Abadia, L. G., & Carvalho, M. M. (2018). The circular economy umbrella: Trends and gaps on integrating pathways. *Journal of Cleaner Production*, 175, 525–543. <https://doi.org/10.1016/j.jclepro.2017.11.064>
- Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strategic Management Journal*, 20(2), 195–204.
[https://doi.org/10.1002/\(SICI\)1097-0266\(199902\)20:2<195::AID-SMJ13>3.3.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199902)20:2<195::AID-SMJ13>3.3.CO;2-Z)
- Huysman, S., De Schaepmeester, J., Ragaert, K., Dewulf, J., & De Meester, S. (2017). Performance indicators for a circular economy: A case study on post-industrial plastic waste. *Resources, Conservation and Recycling*, 120, 46–54.
<https://doi.org/10.1016/j.resconrec.2017.01.013>
- Inigo, E. A., Albareda, L., & Ritala, P. (2017). Business model innovation for sustainability: exploring evolutionary and radical approaches through dynamic capabilities. *Industry and Innovation*, 24(5), 515–542. <https://doi.org/10.1080/13662716.2017.1310034>
- Jackson, T. (2009). *Prosperity without Growth: Economics for a Finite Planet*. London: Earthscan.
- Jain, S., Singhal, S., Jain, N. K., & Bhaskar, K. (2020). Construction and demolition waste recycling: Investigating the role of theory of planned behavior, institutional pressures and environmental consciousness. *Journal of Cleaner Production*.
<https://doi.org/10.1016/j.jclepro.2020.121405>
- Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research. *Journal of Consumer Research*, 30(2), 199–218.
<https://doi.org/10.1086/376806>
- Jawahir, I. S., & Bradley, R. (2016). Technological Elements of Circular Economy and the Principles of 6R-Based Closed-loop Material Flow in Sustainable Manufacturing. *Procedia CIRP*, 40, 103–108. <https://doi.org/10.1016/j.procir.2016.01.067>
- Jaworski, B. J., & Kohli, A. K. (1993). Market Orientation: Antecedents and Consequences. *Journal of Marketing*. <https://doi.org/10.2307/1251854>
- Kabongo, J. D., & Boiral, O. (2017). Doing More with Less: Building Dynamic Capabilities for Eco-Efficiency. *Business Strategy and the Environment*, 26(7), 956–971.
<https://doi.org/10.1002/bse.1958>
- Khan, F., Ahmed, W., & Najmi, A. (2019). Understanding consumers' behavior intentions

- towards dealing with the plastic waste: Perspective of a developing country. *Resources, Conservation and Recycling*, 142, 49–58.
<https://doi.org/10.1016/j.resconrec.2018.11.020>
- Khan, F., Ahmed, W., Najmi, A., & Younus, M. (2019). Managing plastic waste disposal by assessing consumers' recycling behavior: the case of a densely populated developing country. *Environmental Science and Pollution Research*.
<https://doi.org/10.1007/s11356-019-06411-4>
- Khan, O., Daddi, T., & Iraldo, F. (2020). Microfoundations of dynamic capabilities: Insights from circular economy business cases. *Business Strategy and the Environment*, 29(3), 1479–1493. <https://doi.org/10.1002/bse.2447>
- Kindström, D., Kowalkowski, C., & Sandberg, E. (2013). Enabling service innovation: A dynamic capabilities approach. *Journal of Business Research*, 66(8), 1063–1073.
<https://doi.org/10.1016/j.jbusres.2012.03.003>
- Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, 221–232.
<https://doi.org/10.1016/j.resconrec.2017.09.005>
- Klein, K. J., Dansereau, F., & Hall, R. J. (1994). Levels Issues in Theory Development, Data Collection, and Analysis. *Academy of Management Review*.
<https://doi.org/10.5465/amr.1994.9410210745>
- Knussen, C., & Yule, F. (2008). “I’m not in the habit of recycling”: The role of habitual behavior in the disposal of household waste. *Environment and Behavior*.
<https://doi.org/10.1177/0013916507307527>
- Knussen, C., Yule, F., MacKenzie, J., & Wells, M. (2004). An analysis of intentions to recycle household waste: The roles of past behaviour, perceived habit, and perceived lack of facilities. *Journal of Environmental Psychology*.
<https://doi.org/10.1016/j.jenvp.2003.12.001>
- Konlechner, S., Müller, B., & Güttel, W. H. (2018). A dynamic capabilities perspective on managing technological change: a review, framework and research agenda. *International Journal of Technology Management*, 76(3/4), 188.
<https://doi.org/10.1504/IJTM.2018.091285>
- Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular Economy: The Concept and its Limitations. *Ecological Economics*, 143, 37–46.
<https://doi.org/10.1016/j.ecolecon.2017.06.041>
- Kumar, V., Sezersan, I., Garza-Reyes, J. A., Gonzalez, E. D. R. S., & AL-Shboul, M. A.

- (2019). Circular economy in the manufacturing sector: benefits, opportunities and barriers. *Management Decision*. <https://doi.org/10.1108/MD-09-2018-1070>
- Lacy, P., & Rutqvist, J. (2015). *Waste to Wealth: The Circular Economy Advantage*. <https://doi.org/10.1057/9781137530707>
- Langley, A. (1999). Strategies for Theorizing from Process Data. *The Academy of Management Review*, 24(4), 691–710. <https://doi.org/10.2307/259349>
- Legambiente. (2019). Circular Economy Made in Italy. Retrieved from https://www.legambiente.it/sites/default/files/docs/circulareconomy_madeinitaly.pdf
- Li, D. yuan, & Liu, J. (2014). Dynamic capabilities, environmental dynamism, and competitive advantage: Evidence from China. *Journal of Business Research*, 67(1), 2793–2799. <https://doi.org/10.1016/j.jbusres.2012.08.007>
- Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. *Journal of Cleaner Production*, 115, 36–51. <https://doi.org/10.1016/j.jclepro.2015.12.042>
- Liedtka, J. (1991). Organizational value contention and managerial mindsets. *Journal of Business Ethics*, 10(7), 543–557. <https://doi.org/10.1007/BF00383352>
- Linder, M., & Williander, M. (2017). Circular Business Model Innovation: Inherent Uncertainties. *Business Strategy and the Environment*, 26(2), 182–196. <https://doi.org/10.1002/bse.1906>
- Liston-Heyes, C., & Vazquez Brust, D. A. (2016). Environmental Protection in Environmentally Reactive Firms: Lessons from Corporate Argentina. *Journal of Business Ethics*. <https://doi.org/10.1007/s10551-014-2473-4>
- Liu, Y., & Bai, Y. (2014). An exploration of firms' awareness and behavior of developing circular economy: An empirical research in China. *Resources, Conservation and Recycling*, 87, 145–152. <https://doi.org/10.1016/j.resconrec.2014.04.002>
- March, J., & Simon, H. (1958). *Organizations*. New York: John Wiley & Sons.
- Merli, R., Preziosi, M., & Acampora, A. (2018). How do scholars approach the circular economy? A systematic literature review. *Journal of Cleaner Production*, 178, 703–722. <https://doi.org/10.1016/j.jclepro.2017.12.112>
- Mousavi, S., & Bossink, B. A. G. (2017). Firms' capabilities for sustainable innovation: The case of biofuel for aviation. *Journal of Cleaner Production*, 167, 1263–1275. <https://doi.org/10.1016/j.jclepro.2017.07.146>
- Mousavi, S., Bossink, B., & van Vliet, M. (2018). Dynamic capabilities and organizational routines for managing innovation towards sustainability. *Journal of Cleaner Production*,

- 203, 224–239. <https://doi.org/10.1016/j.jclepro.2018.08.215>
- Murray, A., Skene, K., & Haynes, K. (2017). The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context. *Journal of Business Ethics*, 140(3), 369–380. <https://doi.org/10.1007/s10551-015-2693-2>
- Narver, J. C., Slater, S. F., & MacLachlan, D. L. (2004). Responsive and proactive market orientation and new-product success. *Journal of Product Innovation Management*. <https://doi.org/10.1111/j.0737-6782.2004.00086.x>
- Niero, M., & Rivera, X. C. S. (2018). The Role of Life Cycle Sustainability Assessment in the Implementation of Circular Economy Principles in Organizations. *Procedia CIRP*, 69, 793–798. <https://doi.org/10.1016/j.procir.2017.11.022>
- Nigbur, D., Lyons, E., & Uzzell, D. (2010). Attitudes, norms, identity and environmental behaviour: Using an expanded theory of planned behaviour to predict participation in a kerbside recycling programme. *British Journal of Social Psychology*. <https://doi.org/10.1348/014466609X449395>
- Nitzl, C., Roldan, J. L., & Cepeda, G. (2016). Mediation analysis in partial least squares path modeling. *Industrial Management & Data Systems*, 116(9), 1849–1864. <https://doi.org/10.1108/IMDS-07-2015-0302>
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- Ormazabal, M., Prieto-Sandoval, V., Jaca, C., & Santos, J. (2016). An overview of the circular economy among SMEs in the Basque country: A multiple case study. *Journal of Industrial Engineering and Management*, 9(5), 1047. <https://doi.org/10.3926/jiem.2065>
- Ormazabal, M., Prieto-Sandoval, V., Puga-Leal, R., & Jaca, C. (2018). Circular Economy in Spanish SMEs: Challenges and opportunities. *Journal of Cleaner Production*, 185, 157–167. <https://doi.org/10.1016/j.jclepro.2018.03.031>
- Paltridge, B. (2002). Thesis and dissertation writing: an examination of published advice and actual practice. *English for Specific Purposes*, 21(2), 125–143. [https://doi.org/10.1016/S0889-4906\(00\)00025-9](https://doi.org/10.1016/S0889-4906(00)00025-9)
- Papagiannakis, G., & Lioukas, S. (2012). Values, attitudes and perceptions of managers as predictors of corporate environmental responsiveness. *Journal of Environmental Management*, 100, 41–51. <https://doi.org/10.1016/j.jenvman.2012.01.023>
- Park, J., Sarkis, J., & Wu, Z. (2010). Creating integrated business and environmental value within the context of China's circular economy and ecological modernization. *Journal of Cleaner Production*. <https://doi.org/10.1016/j.jclepro.2010.06.001>
- Pavlou, P. a., & Sawy, O. a El. (2011). Understanding the ' Black Box ' of Dynamic

- Capabilities. *Management Science*, 92521(1), 239–273. <https://doi.org/10.1111/j.1540-5915.2010.00287.x>
- Petrus, B. (2019). Environmental dynamism: the implications for operational and dynamic capabilities effects. *Management Sciences*, 24(1), 28–36. <https://doi.org/10.15611/ms.2019.1.04>
- Pezeshkan, A., Fainshmidt, S., Nair, A., Lance Frazier, M., & Markowski, E. (2016). An empirical assessment of the dynamic capabilities–performance relationship. *Journal of Business Research*, 69(8), 2950–2956. <https://doi.org/10.1016/j.jbusres.2015.10.152>
- Phan, T. N., & Baird, K. (2015). The comprehensiveness of environmental management systems: The influence of institutional pressures and the impact on environmental performance. *Journal of Environmental Management*. <https://doi.org/10.1016/j.jenvman.2015.06.006>
- Pieron, M. P. P., McAloone, T. C., & Pigosso, D. C. A. (2019). Business model innovation for circular economy and sustainability: A review of approaches. *Journal of Cleaner Production*. <https://doi.org/10.1016/j.jclepro.2019.01.036>
- PlasticsEurope. (2019). *Plastics - the Facts 2019*. Retrieved from <https://www.plasticseurope.org/en/resources/publications/1804-plastics-facts-2019>
- Plummer, R. (2018). *Plastic fantastic: How it changed the world*. Retrieved from <https://www.bbc.com/news/business-42646025>
- Porter, M. E., & Linde, C. van der. (1995). Toward a New Conception of the Environment-Competitiveness Relationship. *Journal of Economic Perspectives*, 9(4), 97–118. <https://doi.org/10.1257/jep.9.4.97>
- Prieto-Sandoval, V., Jaca, C., & Ormazabal, M. (2018). Towards a consensus on the circular economy. *Journal of Cleaner Production*, 179, 605–615. <https://doi.org/10.1016/j.jclepro.2017.12.224>
- Prieto-Sandoval, V., Jaca, C., Santos, J., Baumgartner, R. J., & Ormazabal, M. (2019). Key strategies, resources, and capabilities for implementing circular economy in industrial small and medium enterprises. *Corporate Social Responsibility and Environmental Management*, 26(6), csr.1761. <https://doi.org/10.1002/csr.1761>
- Protogerou, A., Caloghirou, Y., & Lioukas, S. (2012). Dynamic capabilities and their indirect impact on firm performance. *Industrial and Corporate Change*. <https://doi.org/10.1093/icc/dtr049>
- Ragaert, K., Delva, L., & Van Geem, K. (2017). Mechanical and chemical recycling of solid plastic waste. *Waste Management*, 69, 24–58.

- <https://doi.org/10.1016/j.wasman.2017.07.044>
- Ragaert, K., Huysveld, S., Vyncke, G., Hubo, S., Veelaert, L., Dewulf, J., & Du Bois, E. (2020). Design from recycling: A complex mixed plastic waste case study. *Resources, Conservation and Recycling*, 155, 104646. <https://doi.org/10.1016/j.resconrec.2019.104646>
- Ramayah, T., Lee, J. W. C., & Lim, S. (2012). Sustaining the environment through recycling: An empirical study. *Journal of Environmental Management*. <https://doi.org/10.1016/j.jenvman.2012.02.025>
- Reike, D., Vermeulen, W. J. V., & Witjes, S. (2018). The circular economy: New or Refurbished as CE 3.0? — Exploring Controversies in the Conceptualization of the Circular Economy through a Focus on History and Resource Value Retention Options. *Resources, Conservation and Recycling*. <https://doi.org/10.1016/j.resconrec.2017.08.027>
- Ringle, C. M., & Sarstedt, M. (2016). Gain more insight from your PLS-SEM results. *Industrial Management & Data Systems*, 116(9), 1865–1886. <https://doi.org/10.1108/IMDS-10-2015-0449>
- Ringle, C. M., Wende, S., & Becker, J.-M. (2015). *SmartPLS 3*. Retrieved from <https://www.smartpls.com/>
- Ringle, Sarstedt, & Straub. (2012). Editor's Comments: A Critical Look at the Use of PLS-SEM in "MIS Quarterly." *MIS Quarterly*, 36(1), iii. <https://doi.org/10.2307/41410402>
- Ritzén, S., & Sandström, G. Ö. (2017). Barriers to the Circular Economy – Integration of Perspectives and Domains. *Procedia CIRP*, 64, 7–12. <https://doi.org/10.1016/j.procir.2017.03.005>
- Rizos, V., Behrens, A., van der Gaast, W., Hofman, E., Ioannou, A., Kafyeke, T., ... Topi, C. (2016). Implementation of circular economy business models by small and medium-sized enterprises (SMEs): Barriers and enablers. *Sustainability (Switzerland)*, 8(11). <https://doi.org/10.3390/su8111212>
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., ... Foley, J. A. (2009). A safe operating space for humanity. *Nature*, 461(7263), 472–475. <https://doi.org/10.1038/461472a>
- Russo, M. V. (2009). Explaining the impact of ISO 14001 on emission performance: a dynamic capabilities perspective on process and learning. *Business Strategy and the Environment*, 18(5), 307–319. <https://doi.org/10.1002/bse.587>
- Sánchez-Medina, A. J., Romero-Quintero, L., & Sosa-Cabrera, S. (2014). Environmental Management in Small and Medium-Sized Companies: An Analysis from the Perspective

- of the Theory of Planned Behavior. *PLoS ONE*, 9(2), e88504.
<https://doi.org/10.1371/journal.pone.0088504>
- Sarstedt, M., Hair, J. F., Cheah, J.-H., Becker, J.-M., & Ringle, C. M. (2019). How to specify, estimate, and validate higher-order constructs in PLS-SEM. *Australasian Marketing Journal (AMJ)*, 27(3), 197–211. <https://doi.org/10.1016/j.ausmj.2019.05.003>
- Sauvé, S., Bernard, S., & Sloan, P. (2016). Environmental sciences, sustainable development and circular economy: Alternative concepts for trans-disciplinary research. *Environmental Development*. <https://doi.org/10.1016/j.envdev.2015.09.002>
- Scarpellini, S., Marín-Vinuesa, L. M., Aranda-Usón, A., & Portillo-Tarragona, P. (2020). Dynamic capabilities and environmental accounting for the circular economy in businesses. *Sustainability Accounting, Management and Policy Journal*, ahead-of-p(ahead-of-print). <https://doi.org/10.1108/SAMPJ-04-2019-0150>
- Scarpellini, S., Valero-Gil, J., Moneva, J. M., & Andreus, M. (2020). Environmental management capabilities for a “circular eco-innovation.” *Business Strategy and the Environment*, 29(5), 1850–1864. <https://doi.org/10.1002/bse.2472>
- Schilke, O. (2014). On the contingent value of dynamic capabilities for competitive advantage: The nonlinear moderating effect of environmental dynamism. *Strategic Management Journal*. <https://doi.org/10.1002/smj.2099>
- Schroeder, P., Anggraeni, K., & Weber, U. (2019). The Relevance of Circular Economy Practices to the Sustainable Development Goals. *Journal of Industrial Ecology*, 23(1), 77–95. <https://doi.org/10.1111/jiec.12732>
- Sheppard, B. H., Hartwick, J., & Warshaw, P. R. (1988). The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research. *Journal of Consumer Research*, 15(3), 325. <https://doi.org/10.1086/209170>
- Si, H., Shi, J., Tang, D., Wen, S., Miao, W., & Duan, K. (2019). Application of the Theory of Planned Behavior in Environmental Science: A Comprehensive Bibliometric Analysis. *International Journal of Environmental Research and Public Health*, 16(15), 2788. <https://doi.org/10.3390/ijerph16152788>
- Sidique, S. F., Lupi, F., & Joshi, S. V. (2010). The effects of behavior and attitudes on drop-off recycling activities. *Resources, Conservation and Recycling*, 54(3), 163–170. <https://doi.org/10.1016/j.resconrec.2009.07.012>
- Simpson, D. (2012). Knowledge resources as a mediator of the relationship between recycling pressures and environmental performance. *Journal of Cleaner Production*. <https://doi.org/10.1016/j.jclepro.2011.09.025>

- Singh, M. P., Chakraborty, A., & Roy, M. (2018). Developing an extended theory of planned behavior model to explore circular economy readiness in manufacturing MSMEs, India. *Resources, Conservation and Recycling*, 135, 313–322.
<https://doi.org/10.1016/j.resconrec.2017.07.015>
- Stahel, W. R. (2016). The circular economy. *Nature*, 531(7595), 435–438.
<https://doi.org/10.1038/531435a>
- Stewart, R., & Niero, M. (2018). Circular economy in corporate sustainability strategies: A review of corporate sustainability reports in the fast-moving consumer goods sector. *Business Strategy and the Environment*, 27(7), 1005–1022.
<https://doi.org/10.1002/bse.2048>
- Strauss, K., Lepoutre, J., & Wood, G. (2017). Fifty shades of green: How microfoundations of sustainability dynamic capabilities vary across organizational contexts. *Journal of Organizational Behavior*, 38(9), 1338–1355. <https://doi.org/10.1002/job.2186>
- Symbola. (2019). 100 Italian Circular Economy Stories. Retrieved from
<http://www.symbola.net/ricerca/100-italian-circular-economy-stories-la-ricerca-enel-symbola/>
- Taylor, S., & Todd, P. (1995). An Integrated Model of Waste Management Behavior: A Test of Household Recycling and Composting Intentions. *Environment and Behavior*.
<https://doi.org/10.1177/0013916595275001>
- Teece, D. (2000). Strategies for Managing Knowledge Assets: The Role of Firm Structure and Industrial Context. *Long Range Planning*. [https://doi.org/10.1016/S0024-6301\(99\)00117-X](https://doi.org/10.1016/S0024-6301(99)00117-X)
- Teece, D. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319–1350. <https://doi.org/10.1002/smj.640>
- Teece, D. (2009). *Dynamic Capabilities and Strategic Management: Organizing for Innovation and Growth Reprint Edition*. New York: Oxford University Press.
- Teece, D. (2012). Dynamic Capabilities: Routines versus Entrepreneurial Action. *Journal of Management Studies*, 49(8), 1395–1401. <https://doi.org/10.1111/j.1467-6486.2012.01080.x>
- Teece, D., & Pisano, G. (1994). The Dynamic Capabilities of Firms: an Introduction. *Industrial and Corporate Change*, 3(3), 537–556. <https://doi.org/10.1093/icc/3.3.537-a>
- Teece, D., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533. [https://doi.org/10.1002/\(SICI\)1097-](https://doi.org/10.1002/(SICI)1097-)

- 0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z
- Thoradeniya, P., Lee, J., Tan, R., & Ferreira, A. (2015). Sustainability reporting and the theory of planned behaviour. *Accounting, Auditing and Accountability Journal*.
<https://doi.org/10.1108/AAAJ-08-2013-1449>
- Tonglet, M., Phillips, P. S., & Read, A. D. (2004). Using the Theory of Planned Behaviour to investigate the determinants of recycling behaviour: a case study from Brixworth, UK. *Resources, Conservation and Recycling*, 41(3), 191–214.
<https://doi.org/10.1016/j.resconrec.2003.11.001>
- Urbinati, A., Chiaroni, D., & Chiesa, V. (2017). Towards a new taxonomy of circular economy business models. *Journal of Cleaner Production*, 168, 487–498.
<https://doi.org/10.1016/j.jclepro.2017.09.047>
- van der Heijden, K. (2018). Europe's circular economy competitive advantage. Retrieved January 15, 2020, from <https://www.greenbiz.com/article/europes-circular-economy-competitive-advantage>
- Vazquez Brust, D. A., & Liston-Heyes, C. (2010). Environmental management intentions: An empirical investigation of Argentina's polluting firms. *Journal of Environmental Management*, 91(5), 1111–1122. <https://doi.org/10.1016/j.jenvman.2010.01.005>
- Wang, C. L., & Ahmed, P. K. (2007). Dynamic capabilities: A review and research agenda. *International Journal of Management Reviews*. <https://doi.org/10.1111/j.1468-2370.2007.00201.x>
- Wetzels, M., Odekerken-Schröder, G., & Van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Quarterly: Management Information Systems*. <https://doi.org/10.2307/20650284>
- Whetten, D. A., Felin, T., & King, B. G. (2009). The practice of theory borrowing in organizational studies: Current issues and future directions. *Journal of Management*.
<https://doi.org/10.1177/0149206308330556>
- Wijbenga, F. H., & van Witteloostuijn, A. (2007). Entrepreneurial locus of control and competitive strategies – The moderating effect of environmental dynamism. *Journal of Economic Psychology*, 28(5), 566–589. <https://doi.org/10.1016/j.joep.2007.04.003>
- Wilden, R., & Gudergan, S. P. (2015). The impact of dynamic capabilities on operational marketing and technological capabilities: investigating the role of environmental turbulence. *Journal of the Academy of Marketing Science*, 43(2), 181–199.
<https://doi.org/10.1007/s11747-014-0380-y>
- Wilden, R., Gudergan, S. P., Nielsen, B. B., & Lings, I. (2013). Dynamic Capabilities and

- Performance: Strategy, Structure and Environment. *Long Range Planning*.
<https://doi.org/10.1016/j.lrp.2012.12.001>
- Winter, S. G. (2003). Understanding dynamic capabilities. *Strategic Management Journal*, 24(10), 991–995. <https://doi.org/10.1002/smj.318>
- World Commission on Environment and Development. (1987). *Report of the World Commission on Environment and Development: Our Common Future*. Retrieved from <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>
- Wu, J. (2005). *New circular economy*. Beijing: Tsinghua University Press.
- Wu, Q., He, Q., & Duan, Y. (2013). Explicating dynamic capabilities for corporate sustainability. *EuroMed Journal of Business*, 8(3), 255–272.
<https://doi.org/10.1108/EMJB-05-2013-0025>
- Wu, Q., He, Q., Duan, Y., & O'Regan, N. (2012). Implementing dynamic capabilities for corporate strategic change toward sustainability. *Strategic Change*, 21(5–6), 231–247.
<https://doi.org/10.1002/jsc.1906>
- Yang, S., & Feng, N. (2008). A case study of industrial symbiosis: Nanning Sugar Co., Ltd. in China. *Resources, Conservation and Recycling*.
<https://doi.org/10.1016/j.resconrec.2007.11.008>
- Yin, R. K. (2009). *Case Study Research: Design and Methods* (4th ed., Vol. 12). California: Sage Publications Inc.
- Young, P., Byrne, G., & Cotterell, M. (1997). Manufacturing and the environment. *The International Journal of Advanced Manufacturing Technology*, 13(7), 488–493.
<https://doi.org/10.1007/BF01624609>
- Yuan, Z., Bi, J., & Moriguichi, Y. (2008). The Circular Economy: A New Development Strategy in China. *Journal of Industrial Ecology*, 10(1–2), 4–8.
<https://doi.org/10.1162/108819806775545321>
- Yuriev, A., Dahmen, M., Paillé, P., Boiral, O., & Guillaumie, L. (2020). Pro-environmental behaviors through the lens of the theory of planned behavior: A scoping review. *Resources, Conservation and Recycling*, 155, 104660.
<https://doi.org/10.1016/j.resconrec.2019.104660>
- Zahra, S. A., Sapienza, H. J., & Davidsson, P. (2006). Entrepreneurship and Dynamic Capabilities: A Review, Model and Research Agenda*. *Journal of Management Studies*, 43(4), 917–955. <https://doi.org/10.1111/j.1467-6486.2006.00616.x>
- Zhou, S. S., Zhou, A. J., Feng, J., & Jiang, S. (2019). Dynamic capabilities and organizational performance: The mediating role of innovation. *Journal of Management and*

- Organization*. <https://doi.org/10.1017/jmo.2017.20>
- Zhu, Q., Cordeiro, J., & Sarkis, J. (2013). Institutional pressures, dynamic capabilities and environmental management systems: Investigating the ISO 9000 – Environmental management system implementation linkage. *Journal of Environmental Management*, 114, 232–242. <https://doi.org/10.1016/j.jenvman.2012.10.006>
- Zhu, Q., Geng, Y., & Lai, K. hung. (2010). Circular economy practices among Chinese manufacturers varying in environmental-oriented supply chain cooperation and the performance implications. *Journal of Environmental Management*.
<https://doi.org/10.1016/j.jenvman.2010.02.013>
- Zollo, M., & Winter, S. G. (2002). Deliberate Learning and the Evolution of Dynamic Capabilities. *Organization Science*, 13(3), 339–351.
<https://doi.org/10.1287/orsc.13.3.339.2780>

APPENDIX-A: Interview Questionnaire

Microfoundations of Dynamic Capabilities: Insights from Circular Economy Business Cases

Introduction:

- Can you please give a short introduction about yourself and your company?
- How circular economy (CE) can be seen in your company?

Sensing:

- How does your company usually sense new business opportunities? What systems or procedures exist in your company through which your company identified a circular business opportunity? And how did your company evaluate that CE business opportunity?
- How does your company identify customer needs, track market trends, and monitor competitors' activities? What are those specific activities or routines through which your company gather such market intelligence?
- How does your company monitor technological developments in your industry and particularly relevant to CE? And what is the role of your company R&D in achieving this goal?
- How does your company generate and foster CE business ideas? What procedures or practices exist in your company through which your company employees acquire and propose new business ideas?
- How frequently your company engage an active dialogue with external stakeholders and participate in conferences and trade fairs? Are these activities helpful for your company in sensing a CE business opportunity and in developing learning capabilities?
- How frequently your company identifies the environmental impacts of newly developed products or processes? Did LCA help in sensing a CE opportunity?

Seizing:

- How did your company seize a CE opportunity once it was sensed and evaluated as a business opportunity? What resources your company mobilized to capture value? And were there any specific procedures or practices in your company to seize a CE opportunity?
- How did your company redesign the business model? And what changes your company made in the governance structure in pursuit of CE?

- How the strategy was formulated for CE objectives? How strategic decisions were taken in your company? And how the action plan was disseminated among your company employees and stakeholders?
- How did your company identify strategic partners? And how did your company manage collaboration with partners and stakeholders to seize a CE opportunity?
- How significant is the role of investments in R&D activities to seize a CE opportunity? And how did your company plan such investments?

Reconfiguring:

- What resources and assets your company reconfigured in pursuit of CE?
- How did your company manage the acquisition of companies and/or a production plant?
- Whenever your company acquires new technology, systems, and production method, how does your company integrate it into operational capabilities? How does your company impart such new knowledge and skills to employees? Are there any specific practices or regular activities to deal with such situations?
- What organizational changes your company made in pursuit of CE? Did your company hire new employees or top managers (having technical expertise)?

APPENDIX-B: Survey Questionnaire

Sensing, Seizing, and Reconfiguring: Key Capabilities and Organizational Routines for Circular Economy Implementation

The Role of Dynamic Capabilities in Circular Economy Implementation and Performance of Companies

SECTION 1: GENERAL INFORMATION

1.1. Name of Organization:	Organization Name:
1.2. NACE Code:	NACE Code:
1.3. Headquarters (Region):	Our headquarters is situated in (region):
1.4. Age of Organization (Year):	Our organization was founded in (year):
1.5. Size of Organization:	Number of employees in our organization (within Italy) are approximately: a) 1 – 49 b) 50 – 249 c) 250 – 999 d) 1000 – 4999 e) more than 5000
1.6. Geographic Market:	Our organization is selling products and/or services in: a) Local (only a specific region of Italy) b) National (all regions of Italy) c) European (only within EU countries) d) Global Market (all other countries)
1.7. Annual Turnover:	Our organizations' annual turnover is approximately: a) less than 1,000,000 Euros b) 1,000,001 – 2,000,000 Euros c) 2,000,001 – 10,000,000 Euros d) 10,000,001 – 50,000,000 Euros e) higher than 50,000,000 Euros
1.8. Respondent Profile:	My designation in the organization is: a) CEO b) Director c) General Manager d) Environmental Manager e) Others (please specify)

SECTION 2: DYNAMIC CAPABILITIES

2.1: Dynamic Capabilities - Sensing

2.1. How frequently your organization engages the following activities to identify new opportunities in terms of new products / services? Please indicate frequency for each of the following statements (1. Never, 2. Rarely, 3. Sometimes, 4. Often, 5. Regularly)		(1)	(2)	(3)	(4)	(5)
Market Monitoring and Technology Scanning	We identify customer needs					
	We track new market trends in our industry					
	We analyze our competitors' actions					
	We observe technological developments relevant to our industry					



Idea Generation	We organize brainstorming sessions or involve a centralized unit / a group of experts to develop ideas for new products / services					
	We involve customers / suppliers / other stakeholders in new products / services development process					
Knowledge Creation	We undertake R&D activities to create new knowledge / to solve technical problems (for developing new or significantly improved products / production process)					
	We undertake R&D activities to increase the stock of knowledge (trying out new ideas having strategic / operational implication)					
Experiential Learning	We assess the potential environmental impacts of our future products / services					
	We do networking with regulatory institutions / industrial associations / NGOs / universities / and others					

2.2: Dynamic Capabilities - Seizing

2.2. Please indicate your level of agreement with the following statements. These statements refer to the actions that your organization might take once your organization has identified a new opportunity or a possibility to produce new products / to deliver new services (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Strongly Agree).

		(1)	(2)	(3)	(4)	(5)
Strategic Planning	We are competent in formulating a strategy for the development of new products / services					
	We are efficient in finding strategic partners for the development of new products / services					
	We are efficient in planning investments related to requisite R&D or collaborative activity for the development of new products / services					
	We are efficient in capital budgeting related to the requisite manufacturing plant or advanced machinery or other fixed assets for the development of new products / services					
	We are efficient in planning requisite human resources for the development of new products / services					
Business Model and Governance	We are competent in redesigning or transforming our existing business models whenever necessary for the development of new products / services					
	We are efficient in restructuring our governance structure (e.g. hiring or promoting CEO / board of directors / top managers) whenever necessary for the development of new products / services					
Collaboration	We collaborate with universities or research institutes or consultants to acquire requisite knowledge and skills for the development of new products / services					
	We collaborate with partners or suppliers or other organizations to acquire requisite technology or resources for the development of new products / services					
	We engage our employees in interdepartmental cooperation for the development of new products / services					

2.3: Dynamic Capabilities - Reconfiguring

2.3. Have your organization engaged following renewals in the last 10 years in order to accomplish identified opportunities or possibilities to produce new products / to deliver new services? If yes, how well did they succeed in terms of intended objectives? (1. Poorly Failed, 2. Slightly Succeeded, 3. Fairly Succeeded, 4. Well Succeeded, 5. Perfectly Succeeded)

		(1)	(2)	(3)	(4)	(5)
Organizational Restructuring	Merger with or acquisition of another organization					
	Induction of a new or comparatively changed organizational structure (e.g. abandon or addition of a division / department)					

Technological Upgradation	Slight modifications in existing technology / machinery					
	Induction of a new or significantly improved technology / production process					
	Acquisition of a new manufacturing plant or advanced machinery or software (to be used for new or significantly improved products / production process)					
Knowledge Integration	In-house or contracted out training to employees (related to newly-acquired manufacturing plant and/or for the development and introduction of significantly improved products / production process)					
	Acquisition of existing know-how, copyrighted works, patented and non-patented inventions etc. from other organizations (for the development of new or significantly improved products / production process)					
Best Practices Adaption	New business practices for organizing procedures (e.g. supply chain management, business re-engineering, knowledge management, lean production, and quality management etc.)					
	New methods of organizing external relations, work responsibilities and decision making (e.g. partnerships, outsourcing, teamwork, decentralization etc.)					
	New or significantly improved logistics, delivery or distribution methods for inputs / products / services					

SECTION 3: LEVEL OF CIRCULAR ECONOMY IMPLEMENTATION

3. Have your organization been considering or implementing the following practices? (1. Not considering it, 2. Planning to consider it, 3. Considering it, 4. Initiating implementation, 5. Implementing successfully)

Note:- 2. Planning to consider it (i.e. in early phases of discussion and consideration and may not be considered for final implementation), 3. Considering it currently (i.e. the practice has been planned for and on the way to implement but not carried out yet).

		(1)	(2)	(3)	(4)	(5)
Design and Production	We are designing our products in such a way that it can be easily upgraded / repaired / refurbished / remanufactured					
	We are designing our products to be entirely biodegradable / highly recyclable / easily recoverable					
	We are utilizing biodegradable / recyclable packaging for our products					
	We are using closed-loops in the production process, eliminating leaks, and minimizing the waste generation					
	We are increasing the material and energy efficiency of our production process					
	We are transferring (or selling) bi-products / excess energy of our production process to other organizations					
Consumption and Collection	We are offering services to customers for upgrading / repairing / refurbishing of our products					
	We are collecting our end-of-life products / product parts for recycling / materials recovery					
Recycling and Resourcing	We are recycling our production waste and reusing it as an input to another process					
	We are using bi-products / end-of-life products / recycled materials / excess energy as an input in our production process					

SECTION 4: PERFORMANCE

4.1: Objective Performance



4.1. Please evaluate the improvement level of following in the last 5 years particularly in connection with green choices or circular economy initiatives of your organization (1. Not at All, 2. A Little Bit, 3. To Some Degree, 4. Relatively Significant, 5. Significant)

		(1)	(2)	(3)	(4)	(5)
Environmental Performance	Reduced energy consumption					
	Reduced waste generation					
	Reduced atmospheric pollution					
	Decreased water consumption					
Financial Performance	Decreased manufacturing costs / operational costs					
	Increased annual turnover					
	Increased profit growth					
	Increased market share					

4.2: Subjective Performance

4.2. Please indicate your level of agreement with the following statements particularly in connection with green choices or circular economy initiatives of your organization (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Strongly Agree)

		(1)	(2)	(3)	(4)	(5)
Competitiveness	Increased capability to introduce innovative products / services					
	Improved quality of products / services					
	Improved marketing or brand value of products / services					
	Increased accessibility to export market / new markets					
Corporate Reputation	Improved corporate image among customers					
	improved relationship with suppliers / local community / regulatory organization					
	Increased level of satisfaction, trust, and support from investors and partners					
	Increased level of satisfaction, commitment, and loyalty of employees					

SECTION 5: CIRCULAR DYNAMIC ENVIRONMENT

5. Please indicate your level of agreement with the following statements. (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Strongly Agree)

		(1)	(2)	(3)	(4)	(5)
Market Turbulence	Customers in our market are very receptive to circular product ideas					
	Customers expect circular economy initiatives in our industry					
Technology Turbulence	Technological developments provide big opportunities for circular economy in our industry.					
	A large number of circular product ideas have been made possible through technological breakthroughs in our industry.					
Competitive Intensity	Competition on circular ideas and products / services is very intense in our industry					
	Competitors have already introduced circular products in the past years					
	Public institutions expect circular economy initiatives in our industry					

APPENDIX-C: Survey Questionnaire

Assessing the Determinants of Intentions and Behaviors of Organizations towards a Circular Economy for Plastics

SECTION 1: GENERAL INFORMATION

1.1. Name of Organization:	<i>Name of your organization (optional):</i>
1.2. Organization Location (City):	<i>Your organization is located in (name of city) (optional):</i>
1.3. Organization Location (Province):	<i>Your organization is located in (name of province):</i> a) Antwerp b) East Flanders c) Flemish Brabant d) Limburg e) West Flanders f) Hainaut g) Liège h) Luxembourg i) Namur j) Walloon Brabant
1.4. NACE Classification:	<i>Your organization belongs to (NACE classification):</i> a) Mining and Quarrying b) Manufacturing c) Electricity, Gas, and Water Supply d) Construction e) Wholesale and Retail Trade f) Transportation and Storage g) Information and Communication h) Education i) Administrative and Support Services f) Others (please specify)
1.5. NACE Code:	<i>NACE code of your organization (optional):</i>
1.6. Size of Organization:	<i>Number of employees in your organization are approximately:</i> a) 1 – 50 b) 51 – 250 c) 251 – 1000 d) 1001 – 4999 e) more than 5000
1.7. Annual Turnover:	<i>Annual turnover of your organization is approximately:</i> a) less than 1,000,000 Euros b) 1,000,000 – 2,000,000 Euros c) 2,000,001 – 10,000,000 Euros d) 10,000,001 – 50,000,000 Euros e) higher than 50,000,000 Euros
1.8. Respondent Profile:	<i>Your designation in the organization is:</i> a) CEO b) General Manager c) Environmental Manager d) Others (specify)

SECTION 2: ATTITUDE TOWARDS RECYCLING PLASTIC WASTE

2. Please rate the degree to which your organization agree or disagree with each of the following statements (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Strongly Agree)

		(1)	(2)	(3)	(4)	(5)
Attitude	Recycling plastic waste is good					
	Recycling plastic waste is useful					
	Recycling plastic waste is rewarding					
	Recycling plastic waste is sensible					
	Recycling plastic waste would give our organization great satisfaction					
	It is our organization's responsibility to recycle plastic waste					

SECTION 3: SOCIAL NORMS TO RECYCLING PLASTIC WASTE

3. Please rate the degree to which you agree or disagree with each of the following statements? (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Strongly Agree)		(1)	(2)	(3)	(4)	(5)
Social Norms	Most people who influence our decisions think that our organization should recycle plastic waste					
	Most people inside our organization think that our organization should participate in recycling plastic waste.					
	Most people outside our organization think that our organization should participate in recycling plastic waste.					
	Many organizations similar to our organization participate in recycling plastic waste					
	Our neighboring organizations participate in recycling plastic waste					

SECTION 4: PERCEIVED BEHAVIORAL CONTROL

4. Please rate the degree to which you agree or disagree with each of the following statements? (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Strongly Agree)		(1)	(2)	(3)	(4)	(5)
Perceived Behavioral Control	Our organization knows what items of plastic waste can be recycled					
	Our organization knows where to take plastic waste for recycling					
	Our organization knows how to recycle plastic waste					
	Whether or not our organization recycles plastic waste is entirely up to us					
	Whether or not our organization recycles plastic waste effectively is completely within our control					

SECTION 5: INTENTIONS FOR RECYCLING PLASTIC WASTE

5. Please rate the degree to which you agree or disagree with each of the following statements? (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Strongly Agree)		(1)	(2)	(3)	(4)	(5)
Intentions	Our organization intends to recycle plastic waste					
	Our organization plans to recycle plastic waste					
	Our organization is willing to put efforts to recycle plastic waste					
	Our organization is willing to participate or continue plastic recycling					

SECTION 6: BEHAVIOR TOWARDS RECYCLING PLASTIC WASTE

6. Have your organization been considering or implementing the following practices? (1. Not Considering It, 2. Considering It, 3. Planning It, 4. Initiating Implementation, 5. Implementing Successfully)		(1)	(2)	(3)	(4)	(5)
Behavior	Utilizing eco-friendly packaging					
	Segregating plastics from other waste					

	Handing over generated plastic waste to a waste management company					
	Selling generated plastic waste to other organizations					
	Reusing generated plastic waste within our organization					
	Reducing the generation of plastic waste					

SECTION 7: BARRIERS TO RECYCLING PLASTIC WASTE

7. Please rate whether you agree or disagree that the following factors cause hindrance for your organization in recycling plastic waste (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Strongly Agree)		(1)	(2)	(3)	(4)	(5)
Barriers	Lack of funds for recycling plastic waste					
	Lack of enough time to sort plastic waste					
	Lack of skilled personnel to sort plastic waste					
	Lack of enough space to store plastic waste					
	Lack of easy access to recycling facilities					
	Lack of convenient transport to handover plastic waste					
	Lack of an environmental expert at management level					
	Lack of information about potential buyers of plastic waste					

SECTION 8: ENABLERS TO RECYCLING PLASTIC WASTE

8. Please rate to what extent the following actions (if they are introduced and exercised) might help your organization in recycling plastic waste. (1. Unhelpful, 2. Slightly Helpful, 3. Moderately Helpful, 4. Very Helpful, 5. Extremely Helpful)		(1)	(2)	(3)	(4)	(5)
Enablers	Government enforcing further strict regulations					
	Government providing economic incentives					
	Institutions advising funding possibilities					
	Institutions organizing training programs					
	Institutions establishing a networking platform to facilitate selling or reuse of plastic waste					
	Waste management companies providing necessary guidelines and facilities					
	Waste management companies providing better quotes or charging an affordable fee					

SECTION 9: INSTITUTIONAL PRESSURES FOR RECYCLING PLASTIC WASTE

9. Please rate whether you agree or disagree that following factors push your organization towards recycling plastic waste (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Strongly Agree)		(1)	(2)	(3)	(4)	(5)
Institutional Pressures	International trade regulations					
	EU regulations on plastic recycling					
	Local regulations on plastic recycling					
	Threat of future environmental regulations					
	Green strategies of competitors					
	Environmental awareness of customers					
	International trade regulations					

CURRICULUM VITAE

PERSONAL INFORMATION

Owais Ur Rehman Khan

📍 Piazza Martiri della Libertà, 33, 56127 Pisa, Italy

☎ +393510058260

✉ o.khan@santannapisa.it, owaisurrehman.khan@ugent.be

Sex : Male

Date of Birth : 06/01/1987

PROFESSIONAL SUMMARY

- 1-year experience in an environmental consultancy (industrial waste management)
- 5-year experience in different sectors including steel, textile, petroleum, and chemical industries
- Excellent knowledge of waste management and occupational health & safety
- Good knowledge of environmental laws, regulations, industrial practices & production processes
- Good knowledge of qualitative and quantitative research methods
- Excellent analytical skills, communication skills, teaching skills, team-working & managerial skills

RESEARCH / WORK INTERESTS

Sustainability Management, Circular Economy, Materials Flow Analysis (MFA), Life Cycle Assessment (LCA), Industrial Symbiosis, and Waste Management, etc.

ACADEMIC QUALIFICATIONS

Sep 2019 – Present

Joint Ph.D. in Environmental Sciences and Technology

EQF Level 8

Ghent University, Belgium

- Course: Clean Technology and Life Cycle Analysis

Oct 2017 – Present

Joint Ph.D. in Management Innovation, Sustainability, and Healthcare

EQF Level 8

Scuola Superiore Sant'Anna Pisa, Italy

- Specialization: Sustainability Management
- Courses: (i) Advanced Sustainability - Life Cycle Assessment and Environmental Footprint, (ii) Sustainability Management, (iii) Surviving Research Methodologies, (iv) Experimental Methodologies for Management Research, (v) Management Theories, (vi) High-Tech Entrepreneurship, (vii) Economic and Management of Innovation, (viii) Scientific English for Researchers, (ix) Writing for Academic Management Journals, (x) How to Publish in International Journals, (xi) Applied Statistics for Social Science, (xii) Trajectories of Public Management Models, (xiii) Performance Management in Healthcare, (xiv) Working with STATA - Statistical Software, (xv) Introduction to Social Network Analysis, and (xvi) Social Marketing

Sep 2015 – Aug 2016

M.Sc. in Environmental and Energy Management

EQF level 7

University of Twente, the Netherlands

- Specialization: Energy Management
- Courses: (i) Sustainable Management Strategies and Innovation, (ii) Environment and Technology, (iii) Environmental Management, (iv) Environmental Law, (v) Energy Management, Policy & Technology, (vi) Operations Management, (vii) Policy & Governance for Sustainability Issues, (viii) Financial Analysis, (ix) Ecology, Society and Sustainable Development, (x) Case Study and Research Methodology
- Case Study Project: Fossil Fuel Free City Leeuwarden
- Research Thesis: Promoting Cleaner Production and Energy Efficiency in the Industrial Sector

Jan 2011 – Nov 2013

M.A. in Political Science

EQF level 6

University of Karachi, Pakistan

Jan 2007 – Dec 2011

B.S in Applied Chemistry & Chemical Technology

EQF level 6

University of Karachi, Pakistan

- Specialization: Petroleum Refining & Petrochemicals Technology
- Courses: Chemical Engineering, Chemistry, Physics, Mathematics, and Computer, etc.
- Industrial Processes Studied: Petroleum, Steel, Textile, Pharmaceuticals, and Fertilizers, etc.
- Research Project: Re-Refining of Waste Lubricating Oil

WORK EXPERIENCES

Sep 2016 – Sep 2017

Manager Operations – EHS & Waste Management

EMC WMC Private Limited, Pakistan

- Managing overall operations of environmental services and industrial waste management
- Planning business & projects, monitoring waste management activities and ensuring HSE protocols
- Developing methodology for safe and environmentally friendly disposal of industrial waste
- Assessing environmental hazards and health risks associated with industrial waste
- Advising cost-effective treatment of industrial waste to comply with environmental standards
- Preparing proposals, project reports, budget, invoices, and negotiating clients and business deals

Jul 2012 – Aug 2015

Senior Lab Analyst – QA/QC & EHS

Aisha Steel Mills Limited, Pakistan

- Managing overall operations of the chemical laboratory to support departmental activities of QA/QC, Production, Utilities, and EHS. Also, supervising, training and assigning daily tasks to subordinates

Jun 2010 – Jun 2012

- Monitoring process parameters to improve plant operations and product quality
- Ensuring compliance with ISO standards relevant to quality, safety, and environment
- Performing routine chemical analysis of pickling acid, emulsion, oil and water samples, etc.
- Preparing reports, maintaining a logbook, ensuring lab safety, documenting and emailing, etc.

Chemist

Gul Ahmed Textiles Mills Limited, Pakistan

- Performed tasks to support the R&D & application section of the lab
- Performed tasks for cost reduction planning & improved product quality by substitute means
- Testing and evaluation of dyes & pigments suitability for dyeing and printing processes
- Matching color shades using Data Colour International for dyeing processing

CERTIFICATE COURSES

Dec 2013

- **Total Quality Management (TQM)**

National Productivity Organization (NPO), Islamabad (Pakistan)

Sep 2011 – Dec 2011

- **Health, Safety & Environment (EHS)**

Skill Development Council, Karachi (Pakistan)

Oct 2011

- **Environmental Management Systems (EMS) ISO – 14001**

National Institute of Labour Administration & Training (NILAT), Karachi (Pakistan)

Oct 2011

- **Fire Prevention and Control, Fire Emergency and Rescue Operation**

National Institute of Labour Administration & Training (NILAT), Karachi (Pakistan)

Jul 2011

- **Quality Management System (QMS) ISO – 9001:2008**

National Institute of Labour Administration & Training (NILAT), Karachi (Pakistan)

PUBLICATIONS

To be Submitted

Published

- Khan, O., De Meester, S., Dewulf, J. Materials Flow Analysis (MFA) of Plastics by Polymer Type
- Khan, O., Daddi, T., & Iraldo, F. (submitted). Sensing, seizing, and reconfiguring: Key capabilities and organizational routines for circular economy implementation. *Journal of Cleaner Production*
- Khan, O., Daddi, T., & Iraldo, F. (2020). The role of dynamic capabilities in circular economy implementation and performance of companies. *Corporate Social Responsibility and Environmental Management*, 1–16. <https://doi.org/10.1002/csr.2020>
- Khan, O., Daddi, T., Slabbinck, H., Kleinhans, K., Vazquez-Brust, D., & De Meester, S. (2020). Assessing the determinants of intentions and behaviors of organizations towards a circular economy for plastics. *Resources, Conservation and Recycling*, 163, 105069. <https://doi.org/10.1016/j.resconrec.2020.105069>
- Khan, O., Daddi, T., & Iraldo, F. (2020). Microfoundations of dynamic capabilities: Insights from circular economy business cases. *Business Strategy and the Environment*, 29(3), 1479–1493. <https://doi.org/10.1002/bse.2447>

EU RESEARCH

PROJECTS

- Interreg 2 Seas PlastiCity, LIFETACKLE, TOURISME, and GREENCOACH

CONFERENCES &

WORKSHOP

- Innovation, Design & Networking for a Circular & Sustainable Economy, Pisa, April 2019
- IABS Business & Society European Paper Development Workshop, Rome, November 2018
- EU Circular Businesses Conference, Brussels, September 2018

HONORS & AWARDS

International Level Scholarship

- Achievement of the Erasmus+ Mobility Scholarship in 2019
- Achievement of the Scuola Superiore Sant'Anna Pisa Fully Funded Scholarship in 2017
- Achievement of the University of Twente Fully Funded Scholarship (UTS) in 2015
- Achievement of Higher Education Commission (HEC) Talent Farming Scholarship in 2010
- Achievement of highest marks in Chemistry, 99 out of 100, in SSC Examination Karachi-2002
- Achievement of Leeuwarden Courant (LC) Awards on Fossil Fuel Free City Project in 2016

National Level Awards

City / Regional Level Awards
Competitions and Awards

PERSONAL SKILLS

Native Language

Other Language Skills

Industrial / Professional Skills

Communication Skills

Organizational / Managerial Skills

Software Skills (relevant to
Academic Research)

- Urdu
- English (Fluent)
- Knowledge of ISO, GMP, QMS, EMS, TQM, OHSAS, SHE, SAP and Kaizen etc.
- Excellent communication skills
- Good team leading and organizational skills
- Excellent command of SmartPLS 3 and STAN software
- Good command of NVivo 12, e-Sankey, and SAP software
- Basic command of STATA, RStudio, OpenLCA, and SimaPro software

