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DERVİŞLER

INNOVATION IN MIXED MARKET ECONOMIES: THE CASE OF METU
TECHNOPOLIS IN TURKEY

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INNOVATION IN MIXED MARKET ECONOMIES: THE CASE OF METU TECHNOPOLIS IN TURKEY

A Ph.D. Dissertation

by
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Ankara

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To my family



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TECHNOPOLIS IN TURKEY

The Graduate School of Economics and Social Sciences
of
İhsan Doğramacı Bilkent University

by

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By Olgu Dervişler

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Doctor of Philosophy in Political Science.

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ABSTRACT

INNOVATION IN MIXED MARKET ECONOMIES: THE CASE OF METU TECHNOPOLIS IN TURKEY

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This dissertation examines the conditions under which innovation would be possible in a Mixed Market Economy, also known as the Mediterranean Market Economy, (MME) at the sub-national level through covering a case study which was conducted in METU Technopolis of Turkey. The Varieties of Capitalism (VoC) literature identifies two ideal-typical market economies which are Liberal Market Economies (LMEs) and Coordinated Market Economies (CMEs), yet MMEs are regarded as the third category. Due to a lack of strong institutional complementarities and macro-level coordination, this market type is regarded as disadvantageous to have high innovation performance. However, Systems of Innovation (SI) literature suggests that independent of macro-level coordination and institutional complementarities, owing to local and place-specific factors, high innovation performance would still be possible in an MME. In this context, within the framework of this dissertation, seventeen semi-structured interviews were conducted with the firms in METU Technopolis to understand the conditions which would lead to the innovation outcome in an MME. This study demonstrates that in a sub-national innovation system of an MME, both macro-level and sub-national level factors have an impact on the innovation outcome,

at various levels. Despite the fact that macro-level institutions have a complementary role in innovation performance when it comes to particular competencies to overcome the coordination problems in the market, firms have difficulties. However, as findings demonstrate, thanks to place-specific factors, local resources, and a high level of interaction with stakeholders at the sub-national level, firms in this ecosystem produce innovation.

Keywords: Varieties of Capitalism, Systems of Innovation, Mixed Market Economies, Mediterranean Market Economies, Coordination

ÖZET

KARMA PAZAR EKONOMİLERİNDE İNOVASYON: TÜRKİYE'DEKİ ODTÜ TEKNOKENT ÖRNEĞİ

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Bu tez, Akdeniz tipi pazar ekonomisi (MME) olarak da bilinen karma pazar ekonomilerinde inovasyonun alt-ulusal düzeyde mümkün olabileceği koşulları, Türkiye'de bulunan ODTÜ Teknokent'te yürütülen bir vaka çalışmasını da kapsayacak şekilde ele almaktadır. Kapitalizmin Çeşitleri (VoC) literatürü, liberal pazar ekonomileri (LME'ler) ve koordineli pazar ekonomileri (CME'ler) olmak üzere iki tip ideal pazar ekonomisi tanımlamaktadır. Ancak karma pazar ekonomileri (MME'ler) bu literatürde ideal olarak tanımlanmayan, üçüncü bir kategori olarak kabul edilmektedir. Literatür, güçlü kurumsal arka plan tamamlayıcılıklarının ve makro düzeyde koordinasyonun olmaması nedeniyle, bu pazar türünü yüksek inovasyon performansına sahip olma bağlamında dezavantajlı olarak görmektedir. Bununla birlikte, İnovasyon Sistemleri (SI) literatürü, makro düzeydeki koordinasyondan ve güçlü kurumsal arka plandan bağımsız olarak, yerel ve bulunulan yere özgü faktörler sayesinde, karma pazar ekonomilerinde de yüksek inovasyon performansının hala mümkün olabileceğini öne sürmektedir. Bu bağlamda, bu tez çerçevesinde, bir karma pazar ekonomisinde inovasyonun üretilmesini sağlayan koşulları anlamak amacıyla Türkiye'de yer alan ODTÜ Teknokent'teki firmalarla on yedi yarı yapılandırılmış

mülakat gerçekleştirilmiştir. Bu çalışma, bir karma pazar ekonomisinin alt ulusal inovasyon sisteminde, hem makro düzeydeki hem de yerel düzeydeki faktörlerin, farklı seviyelerde, inovasyon çıktısı üzerinde etkisi olduğunu göstermektedir. Makro düzeydeki kurumsal arka planın inovasyon performansı üzerinde tamamlayıcı bir rolü olmasına rağmen; pazardaki koordinasyon sorunlarını aşmak için belirli yetkinliklerin geliştirilmesi söz konusu olduğunda, firmaların zorluk yaşadığı görülmektedir. Bununla birlikte; çalışma bulguları, bulunulan yere özgü faktörler, yerel kaynaklar ve yerel düzeydeki paydaşlarla tesis edilen yüksek düzeyde etkileşim sayesinde bu ekosistemdeki firmaların inovasyon üretimlerinin sağlandığını göstermektedir.

Anahtar Kelimeler: Kapitalizm Çeşitleri, İnovasyon Sistemleri, Karma Pazar Ekonomileri, Akdeniz Tipi Pazar Ekonomileri, Koordinasyon

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LIST OF ABBREVIATIONS

VoC	Varieties of Capitalism
LME	Liberal Market Economy
CME	Coordinated Market Economy
MME	Mediterranean Market Economy or Mixed Market Economy
HME	Hierarchical Market Economy
DME	Dependent Market Economy
SI	Systems of Innovation
NIS	National Systems of Innovation
SNIS	Sub-National Innovation Systems
RIS	Regional Innovation System
LIS	Local Innovation System
METU	Middle East Technical University
IT	Information Technology
ICT	Information and Communication Technology
R&D	Research and Development
USA	United States of America
USD	The United States Dollar
TTGV	Technology Development Foundation
YASAD	Software Manufacturers Association
TUBITAK	Scientific and Technological Research Council of Turkey
KOSGEB	Small and Medium Industry Development Organization
TEYDEB	Technology and Innovation Funding Programs Directorate

CHAPTER I

INTRODUCTION

1.1 The Main Concept of the Study

In today's global political economy, the innovation performance of market economies is at the heart of competitiveness. Switzerland, the United States, and Sweden are at the forefront of innovation (World Intellectual Property Organization, 2022). These political economies are all either liberal market economies (henceforth LMEs) or Coordinated Market Economies (henceforth CMEs). This extraordinary performance is what a large body of literature, Varieties of Capitalism (henceforth VoC), expects. In fact, this literature that dominates much of contemporary political economy thinking mostly argues that it is only in these two "varieties" of capitalism, LMEs, and CMEs, do we expect innovation. It is learned from the literature on comparative political economy that, like the other political-economic outcomes, innovation is the result of strong institutional complementarities in these two varieties. This literature, therefore, assumes that in no other variety of capitalism do we find innovation, in every sense of the word. Innovation is generally defined as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003). As the comparative literature shows, innovation is "a socially and territorially embedded, interactive or reflexive process" (Asheim & Herstad, 2005).

VoC literature identifies other hybrid varieties of capitalism, conveniently coined as Mediterranean Market Economies, also-known-as Mixed Market Economies (henceforth MMEs). These market economies supposedly lack mutually beneficial institutional complementarities, resulting in poorer macroeconomic as well as microeconomic performance compared to ideal-typical market economies of LMEs and CMEs. MMEs are identified with broad state intervention in their economic histories. In an MME, the state plays a crucial role in the economy. Moreover, in certain areas, the state has a prevailing position to lead the market. However, the VoC literature mostly disregards the state's role in the market (Nölke et al., 2019). Hence, MMEs that have more state involvement in their economic histories are not covered in the literature in detail (Kim & Kim, 2021). The bifurcation of ideal-typical market categories in the VoC literature excludes the MMEs and other Asian market economies (Witt & Redding, 2013, p. 295).

Although at the top of the list of innovators are in fact ideal typical cases of LMEs and CMEs this literature showcases, at sub-national levels, there are several successful innovation systems in these market economies whereby the VoC literature does not expect innovation to flourish. This dissertation focuses on these other deviant cases and addresses the research question of “How can innovation be possible in an MME?” In doing so, the dissertation analyzes the conditions under which firms can successfully create innovation in a sub-national ecosystem in Turkey, as an MME, that supposedly has less effective institutional complementarities compared to LMEs and CMEs, similar to other MMEs, to support firms' innovation performance.

In this dissertation, the conditions which lead to innovation outcomes at the meso-level in a market economy are addressed. For this reason, in this context, the sub-national innovation system concept refers to a local or regional innovation ecosystem in a market economy, and “sub-national” does not refer to any administrative division, but a territorial identification of innovation systems in a market economy.

1.2 The Problem, Its Setting, and the Context

This dissertation primarily asks, “Although the literature assumes that institutional complementarities are inadequately built in an MME, how can innovation be possible in this market economy type?” In addressing this question, the conditions under which firms in a successful Turkish innovation ecosystem produce innovation will be studied in depth. The VoC literature largely assumes that MMEs do not have strong institutional complementarities, thus firms operating in these market economies cannot solve their coordination problems completely and as a result of that, these markets do not perform well as ideal-typical market economies which are LMEs and CMEs. These outlier market economies’ overall performance is predicted lower compared to ideal-typical models. In this context, firms operating in MMEs are regarded as disadvantageous in terms of innovation performance as well. Due to the high level of state involvement in these market economies, MMEs are regarded as the third and the outlier category. In the literature, it is also claimed that “in any institutional environment, there is a trade-off between the state’s market

intervention and innovation,” hence MMEs are considered as the lower innovation performers compared to LMEs and CMEs (Kim & Kim, 2023, p. 280).

In contrast to the assumptions of the VoC literature that MMEs are not high performers due to the lack of strong institutional set-up at the macro-level, Systems of Innovation (henceforth SI) literature assumes that in a market economy, a high level of innovation performance is possible at the sub-national level. Thanks to place-specific factors, an innovation ecosystem can have a high level of innovation performance accordingly. Hence, at the sub-national level, independent of macro-level coordination or strong institutional complementarities, innovation outcomes would be possible.

In this dissertation, regarding the assumptions of these two sets of literature (VoC and SI), a sub-national innovation system in an MME which is Middle East Technical University (henceforth METU) Technopolis in Turkey will be addressed and under which conditions innovation would be possible in an MME will be questioned. This dissertation project will primarily address a set of questions which are as “Under the conditions that, there are supposedly less effective institutional complementarities and macro-level coordination which would be complementary to high innovation performance in an MME, as VoC claims, (in contrast to CMEs or LMEs), how do firms in this market economy manage to create innovation?”, “Although the VoC literature identifies complementarities as an indispensable prerequisite to innovation, can there be different place-specific variables and conditions resulting in similar outcomes (i.e. innovation)?” and finally, “In this case,

what may be other functional equivalents of complementarities potentially supporting innovation?”

The VoC literature claims that institutional complementarities determine innovative capabilities in different contexts (Allen, 2013). In the literature, it is suggested that, compared to LMEs and CMEs, MMEs have disadvantages in terms of innovation outcomes (Hall & Soskice, 2001; Malik, 2017). Hence, the literature assumes that different institutional layouts produce different innovation outcomes. The firm ecosystems which are shaped by the “corporate finance regimes,” “corporate finance methods,” “labor market systems” and “inter-firm networks” cause an innovation pattern to be produced in different innovation settings (Hall & Soskice, 2001). In the setting classification, Turkey is positioned as an MME which is unequivocally regarded as disadvantageous when it comes to having high innovation performance.

In the literature, Turkey is classified as an MME which is regarded as a non-variety of capitalism (Schmidt, 2009; Bölükbaşı, 2012). It considers that this market economy does not fit into the binary division of the VoC literature. Turkey is characterized by a “statist policy style” (Bolukbasi & Ertugal, 2018). In the 1980s, Turkey underwent a market-oriented transformation “not only in the economic field” but also “in the spheres of politics, culture, and foreign policy initiatives” (Öniş, 2004, p. 113). However, in its economic history, the state played a crucial role in the market and it has mixed market characteristics.

In this dissertation, I will mainly focus on the dynamics behind the innovation patterns of the Turkish firm ecosystem at the sub-national level. Focusing on a

successful innovation system in an MME will allow me to identify similarities and differences between firms of a sub-national innovation system, operating in different areas. This dissertation will not only contribute to the literature by identifying the conditions which make innovation possible in an MME at the sub-national level which is neglected or underestimated in the literature but also at the secondary level of analysis, the differences between innovation patterns of different firms with different scales, operating in different fields will be elaborated. In addition to that, the case study results to be covered in this dissertation will reflect the circumstances which create a barrier against a higher innovation performance in an MME as well.

In the framework of the VoC literature, MMEs are not prioritized and not studied in detail either at the category or country level. Besides, the sub-literature addressing the innovation patterns in MMEs is substantially limited. Currently, there does not exist, to the best of my knowledge, any study which examines the conditions under which firms in technopoles of MMEs produce innovation within the framework of VoC and SI literatures. At the sub-national and ecosystem-specific (meso) level, academic studies addressing MMEs are limited. At that point, I think that this dissertation will contribute to the literature by providing a new perspective, engaged with the mainstream VoC and SI literatures. Furthermore, at the case study to be conducted within the framework of this study, I will assess the conditions under which technopolis firms in Turkey that are operating in different business areas produce innovation. Hence, the findings in this research will form a basis for further research on the comparison of firm ecosystems in MMEs and other market economies such as LMEs, CMEs, Dependent Market Economies (henceforth DMEs), or Hierarchical Market Economies (henceforth HMEs).

1.3 The Significance of the Study

VoC literature has provided a fertile ground to classify market economies by considering common characteristics. Even though it has constraints and rigidities, it is still a leading literature in comparative political economy. In the mainstream VoC approach, the economies such as Greece, France, Italy, Portugal, Spain, and Turkey are identified as MMEs. However, the characteristics of MMEs are not defined as precisely as the characteristics of LMEs and CMEs, and these markets are regarded as the third category. Furthermore, the innovation typologies of the VoC literature which are radical innovation and incremental innovation are limited to the LME and CME cases, and the innovation behaviors of the firms in MMEs are disregarded in the literature. The VoC literature does not address the innovation patterns in MMEs which does not allow the scholars to make comparisons between the MMEs and LMEs/CMEs.

In the VoC literature, the market economies are examined at the macro-level and the innovation dynamics in the market economies are mostly studied for ideal-typical markets. In the last decade, several scholars emphasized that in the future studies of Comparative Capitalisms, firms' "innovative competencies" developed through their abilities should be addressed on more "meso-level" or "micro-level" rather than them to be addressed at the "macro-level" analyses. In order to actualize it, it is suggested firms and industries to be studied comparatively (Allen, 2013, p. 773; Kristensen & Morgan, 2012). Besides, Allen (2013) suggests that a broader perspective should be acquired and heuristic concepts to be consulted when it comes

to categorize innovation patterns in a market beyond the “radical” and “incremental” innovation dichotomy. He suggests heuristic concepts such as “appropriability” and “visibility” to be used and “discontinuous innovation” to be used as an alternative to “radical innovation” and “incremental innovation” (Allen, 2013).

The VoC literature does not expect high innovation performance to be achieved in MMEs. Besides, under which conditions, innovation can be produced in an MME is not addressed in the literature profoundly. Due to the lack of strong institutional complementarities and macro-level coordination, the literature finds MMEs disadvantageous when it comes to the high level of market or innovation performance. However, as SI literature suggests, at the sub-national level, these markets have successful or emerging innovation systems. Due to the level of analysis, the high innovation performance of sub-national innovation systems is disregarded in the literature. The high innovation performance of emerging sub-national innovation systems in MMEs creates an empirical puzzle. For this reason, studying the conditions under which firms in an innovation system with that high level of innovation performance that is not expected, comes into question.

This dissertation aims to fill the gaps in the literature in several areas. First of all, it addresses MMEs which are understudied in the VoC literature. The literature is mostly covering ideal-typical market economies which are LMEs and CMEs. There are limited VoC studies covering MMEs. Second of all, in the VoC literature, innovation performance in MMEs is not covered extensively either. Hence, I aim to study the conditions which make innovation possible for firms located in an MME through consulting with another literature, which is SI. On this occasion, I aim to

synthesize two distinct kinds of literatures to reflect conditions leading to innovation patterns in a different coordination level in an MME case, METU Technopolis. And finally, it aims to solve the “innovation puzzle” in an MME. The VoC literature does not expect a high level of innovation performance in an MME. Thus, the existence of high innovation performance at a different coordination level in an MME creates an empirical puzzle that requires an explanation.

1.4 The Main Argument of the Dissertation

In this dissertation, the research question of “How can innovation be possible in an MME?” is primarily addressed. In this context, the conditions under which firms can successfully create innovation in an MME, Turkey which supposedly has less effective institutional complementarities compared to LMEs and CMEs are covered. The VoC literature does not expect high innovation performance in MMEs. Since the macro-level institutional complementarities and the macro-level coordination are regarded as prerequisites for high market performance, including high innovation performance, MMEs with assumably less effective institutional set-ups are regarded disadvantageous. Moreover, both MMEs and their innovation performance are mostly neglected in the literature and the studies covering these subjects are substantially limited. On the other hand, at the sub-national level, there are emerging successful innovation systems in MMEs such as Emilia-Romagna Region in Italy, Kriti Region in Greece, Norte Region in Portugal, Basque Region in Spain, Sophia Antipolis Technopolis in France and METU Technopolis in Turkey.

In today's world, innovation is regarded as a significant outcome that marks the performance of market economies. For this reason, market economies should not only be regarded in the context of comparative capitalisms but also "as an advanced world innovation system of interacting advanced economies." (Soskice, 2022, p. 222) In this dissertation, the innovation performance of sub-national innovation systems in MMEs is addressed. Despite that, at the national level MMEs are regarded disadvantageous to produce innovation, there are successful innovation systems at the sub-national level in MMEs which creates a puzzle.

The main argument of this dissertation is that although the VoC literature disregards the MMEs and their innovation performance and, in the context of innovation performance, finds them disadvantageous compared to ideal-typical market economies, due to a lack of strong institutional complementarities and macro-level coordination, thanks to place-specific local factors - which are addressed in the SI literature - high innovation performance can be possible at the sub-national level in MMEs. In this dissertation, I primarily argue that innovation happens in this unlikely land due to a certain type of coordination which is made possible by non-material and material sources of coordination.

The VoC literature is groundbreaking literature that provides an alternative model to a single neo-liberal model. However, due to the bifurcation, it suggests it has analytical constraints as well. Due to these analytical constraints, MMEs are considered the third and outlier category and disregarded in the literature. However, synthesizing two distinct literatures VoC and SI, and consulting the assumptions of SI regarding the possibility of high innovation performance in a market economy,

would allow the researcher to overcome the reductionist and macro-level-oriented perspective of VoC literature. And it would contribute to resolving the theoretical puzzle. For these reasons, in this dissertation, a sub-national innovation system in an MME is addressed and the conditions which lead to high innovation performance are questioned.

1.5 The Organization of the Dissertation

This dissertation is comprised of an introduction, three chapters, and a conclusion. The organization of the dissertation is given below.

Chapter 2: This chapter is titled as “*Research Approach, Design, and Methods.*” In this chapter, the research approach, design, and methods followed in this dissertation are discussed. Besides, case and sample selection, data collection, and the analysis of the data are elaborated.

Chapter 3: This chapter is titled “*Theoretical Framework.*” In this chapter, firstly the VoC literature is reviewed. After examining the VoC literature, the SI literature and its spin-off literatures which are NIS and SNIS are reviewed. And finally, successful emerging SNIS cases from six MMEs are covered.

Chapter 4: This chapter is titled “*Themes of the Case Study in METU Technopolis.*” In this chapter, the themes that emerged from the findings in the case study conducted within the scope of this dissertation are covered.

Chapter 5: This chapter is titled as “*Conclusion.*” In this chapter, a summary of the context of this dissertation is provided. And then a summary of the main

findings of the dissertation is covered. And finally, further research suggestions are given.

In the following chapter, I provide the details of the research approach, design, and methodology to be followed in this dissertation.



CHAPTER II

RESEARCH APPROACH, DESIGN, AND METHODS

In this chapter, the research approach, design, and methods are discussed. First of all, I will discuss the research approach which is to be applied in this dissertation. And then I will concentrate on the research design to provide details on case and sample selections. Finally, I will cover the research method to elaborate on the data collection methods and the analysis of the data.

2.1 Research Approach

In this dissertation, as a research approach configurational analysis will be applied. The configurational analysis is “any multidimensional constellation of conceptually distinct characteristics that commonly occur together” (Meyer et al., 1993, p. 1175). Various dimensions of “technologies,” “strategies,” “processes,” “practices” and “outcomes” are embedded at multiple layers in “configurations” and “gestalts” (ibid). This approach aims to have a “holistic synthesis” among “reciprocal and nonlinear” attributes (Meyer et al., 1993, p. 1177). This holistic perspective is the distinguishing characteristics of the approach’s “type of explanation.” In contrast to statistical analysis which examines “marginal effects,” configurational analysis allows the researcher to examine the research subject more systemically (Hancke, 2009, p. 43). Configurational analysis approach addresses “the relative arrangement

of parts or elements that can only be fully understood in their entirety” (Fiss, 2009, 428). This approach assumes the “co-occurrence of distinct characteristics” (ibid). Hence, in it, cases are considered as unique and “complex entities” (Kent, 2009, p. 194).

One key strength of configurational analysis is that it relies on “explanations that are of a discrete nature” where “cases as indivisible units that hang together in systemic ways” (Hancke, 2009, p. 43). In this analysis approach, in a small-N, a “combination of factors” which lead to a “particular outcome” is examined (ibid). Through applying this method, it is possible to examine under which conditions or combination of conditions “the particular outcome” would be possible. Hancke regards this method as “subtractive” since it determines “necessary and sufficient conditions” leading to the outcomes. Hence, in this research, “specific” answers are expected more rather than “general” answers analyzed in statistical analysis. In terms of “unit of observation,” rather than focusing on “variables,” “cases as discrete units” are focused on (ibid). Owing to configurational analysis, “specific causalities” can be identified (Hancke, 2009, p. 44). To do so, specific questions should be posed during the fieldwork. This in-depth analysis would allow the researcher to understand “why something happened” (ibid).

In this way, studies use configurational analysis to rely on a logical relationship between the outcome and factors that explain this outcome (Kent, 2009, p. 195) . In order to do that, questions such as “What factors are found in all instances where the outcome is present?” and “Is the outcome always present when particular factors or combinations of factors arise?” may be posed (ibid). Thus, to

understand the causality between the factors and outcome, a holistic examination is performed.

In configurational analysis, “causation is complex,” such as in the social world (Byrne, 2009, p. 101). The cases to be analyzed are regarded as “systems” due to their complex nature (Byrne, 2009, p. 103). Since there is a significant difference between “complex systems” and “linear systems,” a reductionist analysis may be misleading to understand the dynamics behind the outcome (ibid). He regards the complex systems, cases, as “socially constructed” systems that may be encountered at various levels such as “micro,” “meso,” and “macro-level of nation states”(Byrne, 2009, p. 104). And, he classifies the “cases at meso-levels” which may not only be “the sum of micro effects” as systems to be addressed via a configurational approach as well (Byrne, 2009, p. 106). In a system, multiple factors can lead to an outcome. Through “deterministic retrodictive knowledge” to be acquired through the configurational analysis, a more in-depth study can be performed (Byrne, 2009, p. 109). The configurational analysis makes “multiple causations” possible (ibid).

In this dissertation, the primary research questions are “How can innovation be possible in MMEs?” and “Under which conditions can firms in an MME produce innovation?” MME is identified as an outlier market economy category in Varieties of Capitalism (henceforth VoC) literature. Hence, in terms of the production of innovation, it is regarded as disadvantageous due to a lack of strong institutional complementarities. To understand how innovation can be possible in MMEs, I also review another literature, Systems of Innovation (henceforth SI). In this literature,

innovation is regarded as an outcome of systemic interaction at various coordination levels.

There are several reasons why I select configurational analysis as a research approach. First of all, configurational analysis provides a holistic approach, rather than a linear one. In the literatures that I am engaged, innovation is considered as an outcome of an interactive process rather than a linear process. Hence, nonlinear factors have a vital role to produce innovative outcomes. The holistic approach of configurational analysis allows me to have a systemic, not reductionist, and multi-dimensional perspective. In this dissertation, I examine the factors which lead to innovation outcomes in an innovation system. Thus, the systemic approach of configurational analysis corresponds to this case. Second, in this dissertation, I examine the conditions which lead to innovation in an MME. Since configurational analysis allows multiple causations possible, I will not only examine reduced factors but also a combination of factors. Third, in this dissertation, I concentrate on a specific innovation system. For this reason, I am required to ask local-specific questions and understand how innovation is possible in this ecosystem. This approach supports specific questions rather than general questions. Specific questions would allow me to understand “why this happened.” Hence, this approach will make me examine beyond visible to subtle.

Although configurational analysis is prioritizing systemic analysis over statistical analysis, to have an overall picture for each theme, I will also provide a “rough” statistical analysis of the data and then perform the configurational analysis for the individual sub-cases. It will allow me to understand the overall direction of

the majority under a certain theme. But also through applying configurational analysis, I aim to understand the “multidimensional constellation of conceptually distinct characteristics that commonly occur together” (Meyer et al., 1993, p. 1175).

2.2 Research Design

This research is designed as a single-country study. The single-country study refers to the “study that uses empirical data exclusively from one country” (Pepinsky, 2019, p. 188). Pepinsky emphasizes that “since the early 2000s...there has been a resurgence of single-country research in comparative politics” (ibid). Besides, the in-depth single-country study paves the way for reaching “general theoretical insights with comparative implications” (Pepinsky, 2019, p. 188).

If a single historical study is “analytically oriented,” such as the present study, it can produce “significant theoretical gains” (Rueschemeyer, 2012, p. 332). Alongside producing “theoretical ideas,” it can also test these ideas and utilize the test output in the interpretation (Rueschemeyer, 2012, p. 307). Single cases can not only lead to “new hypotheses and insights,” but also to be utilized for “theory testing” (Rueschemeyer, 2012, p. 310). Single case studies have a significant impact on the “theoretical implications of least likely cases” as well (Rueschemeyer, 2012, p. 311). These cases do not only serve the test of theory, in addition to that they can provide “persuasive causal explanations” (Rueschemeyer, 2012, p. 312). According to Eckstein (2011), under *ceteris-paribus* conditions, by selecting a single case study, the researcher can examine a single case more deeply and recover the range loss through in-depth analysis. Thus, Eckstein (2011) regards the single case as the

crucial case. Hence, through leading to more in-depth analysis, single case selection conforms to the configurational analysis approach.

Single case selection will allow me to have a thorough and in-depth perspective on the case I select. By adopting a “within-case” approach, I will examine the single case to “offer insight into the characteristics and causal processes” within the case (Lange, 2013a, p. 41). This approach allows me to do “internal comparison” by “comparing the sub-components” and “comparing the whole with itself” (Lange, 2013a, p. 58). Comparing the different parts of the whole will make me identify the characteristics within the case. This inter-case analysis will make me understand the whole structure and process by examining the similarities and differences among the sub-components (Lange, 2013b, p. 81). Owing to this approach, in the case I examine, I aim to have a “causal narrative” consequently (Lange, 2013b, p. 84).

2.2.1 Turkey as a Least-Likely Case

In this dissertation innovation in MMEs – France, Greece, Italy, Portugal, Spain, and Turkey- is addressed. In the VoC literature, due to a lack of strong institutional complementarities and macro-level coordination, MMEs are regarded as disadvantageous to produce innovation. The Global Innovation Index of the World Intellectual Property Organization mostly verifies this assumption.

The Global Innovation Index provides an innovation performance ranking for countries. In this index, the most innovative economies in the world are arrayed.

Their innovation performance is measured through seven pillars which are “institutions,” “human capital and research,” “infrastructure,” “market sophistication,” “business sophistication,” “knowledge and technology outputs” and “creative outputs” (Bras, 2023, p. 3). Regarding these pillars for countries, the efficiency of converting innovation inputs into innovation outputs is measured. Under the “institutions” pillar, “business environment,” “regulatory environment” and “political environment” are addressed while under the “human capital and research” pillar, “R&D,” “tertiary education” and “education” are addressed. Besides, under the “infrastructure” pillar, “general infrastructure” and “information and communication technologies” are addressed. In the 2022 ranking, “ecological sustainability” is also addressed under this pillar. Under the “market sophistication” pillar, “investment” and “credit” are addressed. In the 2022 ranking, “trade, diversification, and market scale” is also covered under this pillar. Under the “business sophistication” pillar, “knowledge absorption,” “innovation linkages” and “knowledge workers” are addressed. Finally, “knowledge diffusion,” “knowledge impact” and “knowledge creation” are covered under the “knowledge and technology outputs” pillar, and “creative goods and services” are covered under the “creative outputs” pillar. In the 2022 ranking, “online creativity” and “intangible assets” are also addressed under the “creative outputs” pillar (Bras, 2023, p. 8).

In the following table, MMEs' recent global innovation rankings are given.

Table 1 MMEs' Innovation Performance Ranking

Global Innovation Ranking (2020)	Global Innovation Ranking (2021)	Global Innovation Ranking (2022)	Country
12	11	12	France
28	29	28	Italy
30	30	29	Spain
31	31	32	Portugal
51	41	37	Turkey
43	47	44	Greece

source: World Intellectual Property Organization's Global Innovation Indexes, 2020, 2021, and 2022

On the Global Innovation Indexes of the previous successive three years, Turkey and Greece are the lowest performers among MMEs. Hence in these two MMEs, innovation outcome is regarded as rarer compared to the other ones. However, in this timeframe, except for Turkey, MMEs have a relatively steady position. On the other hand, Turkey made comparatively significant progress in terms of innovation performance.

Among MMEs, Turkey and France have more centrally administered innovation structures. Hence, in these MMEs, the impact of national innovation policies on innovation outcomes at the sub-national level is more crystallized. In terms of centralization, France is "at the crossroads between centralization and decentralization" which results in a more complex governance system (Muller et al.,

2009). Plus, in Turkey centrally administered innovation policies shape the innovation outcome at the sub-national level (Gezici et al., 2021). In France and Turkey, technopoles that embody national innovation policies at the sub-regional level are the most significant innovation systems.

Turkey constitutes the ideal test case since it is one of the least-likely cases when seen from the perspective of the dominant literature. Besides, the recent data that belong to the previous three years show that Turkey is the most progressive MME in terms of innovation performance which make Turkey an even more interesting case. Within the framework of this dissertation, Turkey is selected as a single country to study for several reasons. First of all, in Global Innovation Indexes in the previous three successive years of 2020, 2021, and 2022 Turkey is regarded as one of the lowest performers among MMEs. Second, though it is regarded as one of the least-likely cases regarding its performance on the rankings, in this timeframe Turkey has made the most significant progress compared to other MMEs. Finally, in Turkey, the impact of national innovation policies over sub-national innovation systems is more observable. This dissertation aims to examine how innovation can be possible in MMEs. Besides, it examines the conditions under which innovation would be possible in an MME, at the sub-national level, as well. Thus, due to juxtaposition of national and sub-national factors in an innovation system provides a convenient ground to discuss the impact of conditions on the innovation outcome.

2.2.2 METU Technopolis as a Sub-National Innovation System Case

VoC regards MMEs as disadvantageous in the context of innovation. However, in the SI approach it is emphasized that regardless of macro-level coordination and institutional complementarities, thanks to place specific factors and sub-national level coordination, innovation outcomes can still be possible at the sub-national level. Regional and sub-regional innovation systems are regarded as examples where there is high innovation performance in MMEs as well.

In this dissertation, both VoC and SI literatures are addressed together and a sub-national innovation system in Turkey is selected as a field to study. Hence, as MME, Turkey is selected as a single country to study and as a sub-national innovation system, METU Technopolis in Turkey is selected as a sub-national innovation system case. VoC approach is a firm-centric approach. Hence, a firm located in a market economy is regarded vital when it comes to the innovation performance of a market economy. The overall performance of the market economy is regarded as the aggregation of individual firms' innovation performance. Within the context of this dissertation, firms located in METU Technopolis are selected for the field study of the case.

There are several reasons why I select METU Technopolis as a case study. First of all, METU Technopolis in Turkey is the first and one of the leading technopolises and sub-regional innovation systems of Turkey. The establishment project of the technopolis was initiated in 1987 to strengthen university-industry relations and support high-tech development and in 2000 the technopolis started to operate (Varol et al., 2009). The Technopolis area hosts a university, research

institutions, and firms. Besides, a technology transfer office that provides support for university-industry collaboration and ICT Innovation & Technology Centre is located in the technopolis. Thanks to the agglomeration of these structures in the same location, mutual R&D projects are conducted among firms and universities, and associations of firms and knowledge institutions promote innovation and entrepreneurship (METU Technopolis, 2022).

Second, as a government project, innovation outcome in this technopolis is influenced both by national and local factors. It will allow me to examine the conditions which lead to innovation outcomes.

Third, from 2011 to 2016, the technopolis is successively being ranked 1st on the “technology development areas performance index” of Turkey’s Ministry of Science, Industry, and Technology (ibid).

In addition to that, the technopolis was rewarded by the Ministry as the most successful mature technopark in Turkey in 2018 (ibid). Hence, METU Technopolis is one of the most innovative sub-national innovation systems in Turkey.

Finally, currently, the firms positioned in the technopolis are operating in various industries such as software and IT, electronics, mechanics and design, medical technologies, and energy and environment. Thus, this diversity will allow me to do a within-case analysis.

2.2.3 Sample Selection in METU Technopolis

In qualitative research, selecting a sample is important to “draw a representative sample from the population” (Marshall, 1996, p. 522). The sample size is also important to reach “the optimum number necessary to enable valid inferences to be made about the population” (ibid). There are several sampling strategies such as “random and convenience sampling strategies” and “purposive sampling strategies” (Robinson, 2014, pp. 31-32). Purposive sampling enables the researcher to select a sample in a non-random way. In this sampling, different individuals are assumed to have “unique, different or important perspectives on the phenomenon in question” (ibid). Purposive strategies have various sub-strategies such as “stratified,” “cell,” “quota” and “theoretical” strategies (ibid). In order to have a stratified sample, “particular categories or groups of cases” are purposively selected, and a “target number of participants are allocated to each one” (ibid). In order to have a stratified final sample, several stratification criteria are set. To ensure alignment with the population, proportional allocation is performed.

In this dissertation, innovation at a sub-national level in an MME is addressed. In order to examine the research questions of “How can innovation be possible in MMEs?” and “Under which conditions, can innovation be possible in an MME?,” firms located in METU Technopolis are targeted. Besides, for this research project, a purposive (stratified) sampling strategy is selected. In order to select the firms, two sampling stratification criteria are set.

The first stratification criterion is “sectoral/industrial inclusion and diversity.” Currently, the firms positioned in the METU Technopolis (440 firms in total, as of

the field study's date) are operating in various industries such as "software and IT (50%," "electronics (20%)," "mechanics and design (15%)," "medical technologies (6%)," "energy and environment (6%)." In addition to that, the technopolis has three clusters specialized in defense, ICT, and advanced healthcare technologies. One in three firms of the technopolis is defense industry oriented while half of the firms are ICT related. From "smart systems," "mobile apps," and "gaming" to "big data and cloud," the firms are mostly operating in innovative areas (METU Technopolis, 2022). Thus, regarding the overall sectoral distribution of firms, located in METU Technopolis, a sample, containing the same distribution, is aimed to be selected. In this context, the smallest proportion is aimed to be represented by at least one firm.

The second stratification criterion is the firm size. Since the technopolis has different types of firms regarding the firm size, it is aimed to diversify the sample. The technopolis has micro-scaled (less than 10 employees), small-scaled (10-49 employees), medium-scaled (50-249 employees), and large-scaled (more than 250 employees) businesses. Hence, the diversity of firm size is targeted.

When it comes to firm selection, the firm list is acquired from the official website of METU Technopolis. And regarding the business area that firms operate in, in line with the overall distribution, firms are grouped. Since the firm sizes are not specified on the list, in order to anticipate the firm sizes, as an open source, company profiles on LinkedIn are visited. Since the firm size data is not publicly available, for the second criterion, full representation could not be achieved. However, reaching firms of various firm sizes are aimed. Candidate firms are reached via e-mails and phone calls. The ones who consented to involve in the research are invited to

interviews. The initial sample was aimed to be extended until a pattern was established. As a result of the selection process, the following sample, consisted of 17 firms out of 440 firms in total, is selected.

Table 2 The Distribution of the Business Areas and Firm Scales of Technopolis Firms in the Sample

Firm #	Business Area	Firm Scale
1	Defense & Aerospace	Medium Enterprise
2	Healthcare	Micro Enterprise
3	ICT	Small Enterprise
4	ICT	Medium Enterprise
5	Electronics	Medium Enterprise
6	Electronics	Medium Enterprise
7	ICT	Medium Enterprise
8	ICT	Large Enterprise
9	ICT	Small Enterprise
10	Machinery	Small Enterprise
11	Environment	Small Enterprise
12	Machinery	Large Enterprise
13	ICT	Medium Enterprise
14	ICT	Small Enterprise
15	ICT	Small Enterprise
16	ICT	Medium Enterprise
17	Electronics	Micro Enterprise

The following pie charts are given to compare the business area distribution of the population and the sample (see Figures 1 and 2).

Figure 1 METU Technopolis (Business Area Distribution of Firms)

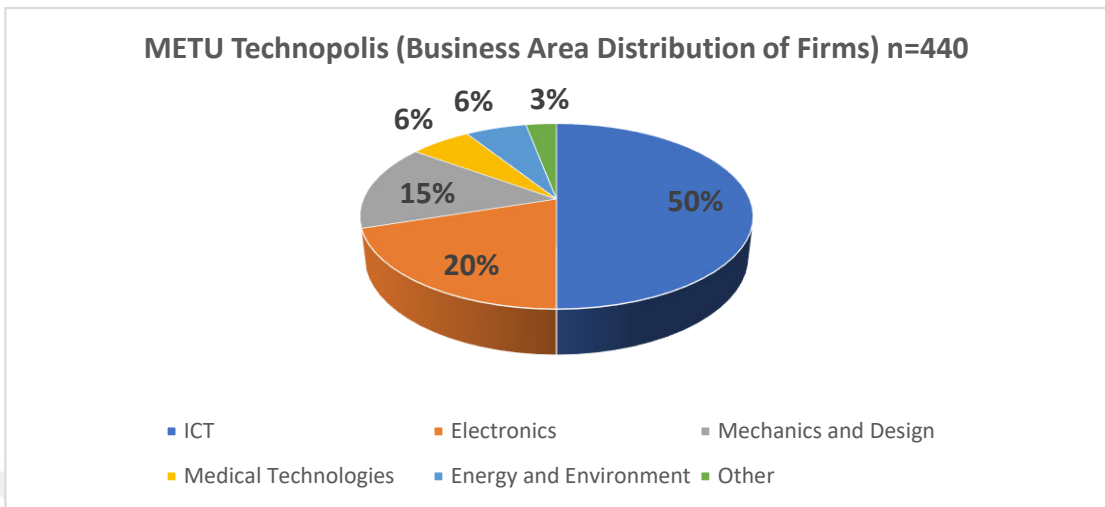
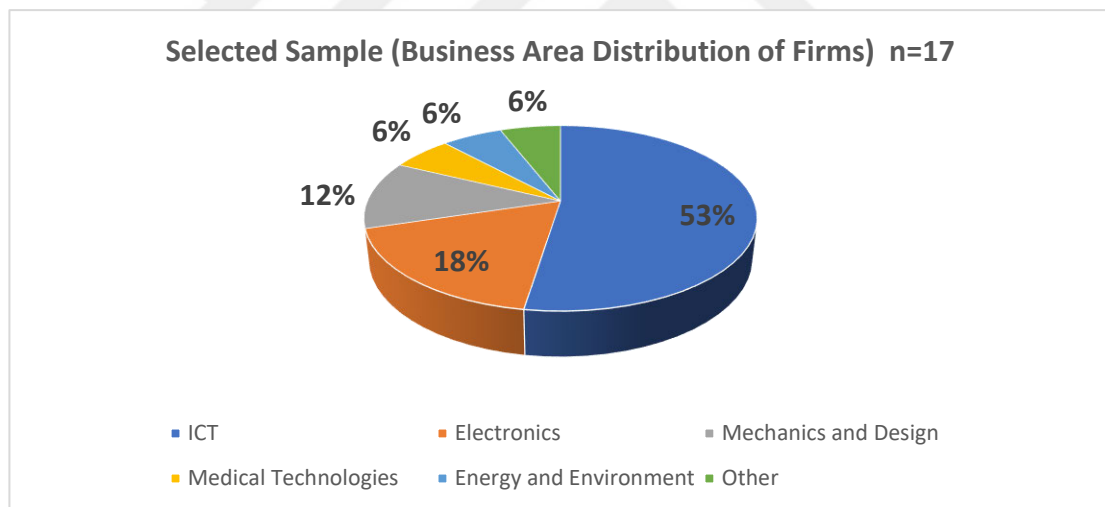


Figure 2 Selected Sample (Business Area Distribution of Firms)



2.3 Research Method: Qualitative Interviews

2.3.1 Data Collection Methods

In this research, qualitative methods will be applied. As it is emphasized in the literature, the method is identified with “the tools, techniques or procedures used

to generate data” (Jackson et al., 2007, p. 25). Particularly, when it comes to examining “experience, meaning, and perspective,” qualitative methods are applied (Hammarberg et al., 2016, p. 499). In contrast to quantitative methods, qualitative methods are mostly utilized to focus on “a realist tradition, utilizing data that are deep and rich to explore subjective understandings and values”(Neale et al., 2005, pp. 1585-1586). Besides, qualitative methods are mostly preferred to understand “a complex phenomenon or one with little information about” (Njie & Asimiran, 2014, p. 35). These methods rely on “text and image data” (Creswell, 2014, p. 183). To collect data in qualitative research, the researcher sets the boundaries of the research first and then collects data through “unstructured or semi-structured observations and interviews” (Creswell, 2014, p. 189). The research site should be determined “purposefully” and the “setting,” “the actors,” “events” and “the process” should be identified carefully ” (Creswell, 2014, p. 190).

In this dissertation qualitative interviewing is applied as a qualitative research technique. The interview is regarded as “a set of techniques for generating data from individuals and/or groups utilizing structured, semi-structured, or unstructured questioning formats”(Jackson et al., 2007, p. 25). This technique is mostly utilized during qualitative research projects due to its “flexibility” and “responsiveness” (ibid). In this research study, I conduct in-depth interviews. These interviews allow me to ask “open-ended questions” to know “the independent thoughts” of individual interviewees (Adams, 2015, p. 494). Thanks to the semi-structured interview format, as a technique, I aim to understand the “authentic accounts of subjective experience” (Miller & Glassner, 2010, p. 125). Hence, through conducting interviews I prioritize to have a holistic understanding of the research subject. The in-depth interview is

regarded as “a form conversation” (Ritchie & Lewis, 2003, p. 138). Though the topic of the interview, themes, and agenda are pre-determined, I aim to maintain flexibility during the interviews (Ritchie & Lewis, 2003, p.141). Thanks to interactivity after posing initial questions, I ask follow-up questions to go beyond “the surface level” to acquire “a deeper and fuller understanding of the participant’s meaning”(ibid). The in-depth interview will allow me to understand the factors underlying the “answers,” “reasons,” “feelings,” “opinions” and “beliefs” of the interviewees (Ritchie & Lewis, 2003, p.141). Besides, owing to the “generative” feature, it allows “new knowledge” to be generated (ibid).

2.3.1.1 Selection of the Variables and Formulation of the Interview Guideline

Semi-structured, in-depth qualitative interviews aim to receive authentic answers from the participants. Hence, thanks to its style, it aims to be flexible and interactive. For the interviews to be conducted within the scope of this research project, a guiding question set consisting of ten questions is formulated. These questions are posed with an introductory question and afterwards, they are supported by follow-up questions. The questions are framed regarding the primary research questions of the dissertation which are “How can innovation be possible in MMEs?” and “Under which conditions can innovation be possible in an MME?” Despite the fact that the question set is formulated in a structured way, they are consulted as the guiding questions in order not to limit the answers of the participants. And during the interviews, by asking follow-up questions the interviews are aimed to be interactive.

VoC approach finds MMEs disadvantageous to produce innovation due to a lack of strong institutional complementarities. It assumes that firms cannot overcome the coordination problem they face in a market economy easily due to a lack of strong institutional complementarities. On the contrary, the SI approach assumes that thanks to local dynamics and sub-national level coordination, innovation outcomes can still be possible in MMEs. In this context, I prepared an interview guideline regarding the key variables from the two literatures I review within the scope of this dissertation.

In the VoC literature, firms in a market economy are assumed to come across a coordination problem. Firms' ability to coordinate with other market actors is regarded as significant in the context of high market performance. Besides, under the circumstances that firms' coordination capabilities are higher and their business actions are supported by the "institutional complementarities," the overall performance of the market, including the innovation performance is expected higher. Hence, firms are expected to establish competencies in five key areas to overcome the coordination problem which is "corporate governance," "industrial relations," "vocational training and education," "inter-firm relations" and "employees" (Hall & Soskice, 2001). On the other hand, SI literature suggests that innovation is an outcome of an "interactive process" with "interdependence and non-linearity" (Edquist, 2006). Hence, firms do not innovate on their own in isolation, yet collaboration with other stakeholders and interdependence make innovation possible (ibid). Furthermore, thanks to "place-specific factors" and "specific local resources," firms can enhance their competitiveness to produce innovation (Asheim & Isaksen, 2002). Thanks to supportive formal institutions such as universities, colleges,

technology transfer agencies, and other training organizations, thus “generation, use, and dissemination of knowledge” (Doloreux & Parto, 2005, p. 134), firms in an innovation system may access knowledge easily and convert it into an innovation outcome.

For these reasons, six variables are generated from VoC literature which are “corporate governance,” “industrial relations,” “vocational training and education,” “inter-firm relations,” “employees” and “macro-level institutional complementarities” and three variables are generated from SI literature which are “place-specific factors and specific local resources,” “interdependence & non-linearity and interaction” and “generation, use, and dissemination of knowledge.”

In this dissertation, “generalizing within the setting, group, or population studied to persons, events, and activities that are not directly represented in the data collected” is targeted (Maxwell, 2021). Hence, it is expected the findings to be produced within the case study through the variables selected in this setting are going to provide external validity for other cases with SNIS in other MMEs.

Regarding these variables, the interview guideline is prepared. This guideline is tested in a pilot interview and refined accordingly.

Table 3 Interview Guideline

#	Interview Guideline	Related Variable on Innovation Performance
1	What kind of R&D projects, and innovation-related activities do you carry out?	N/A (This question is posed to confirm whether the selected firm is carrying out R&D and innovation-related activities or not.)
2	How do you carry out your R&D projects? (e.g. technology transfer, mutual product/service development, mutual R&D projects, etc.)	Inter-firm relations (VoC)

3	Do you think that being located in METU Technopolis has a positive impact on your firm's innovation performance? (e.g. infrastructure, agglomeration/co-location with other firms, clustering, talent pool, know-how, incentives, etc.)	Place-specific factors and specific local resources (SI)
4	Do you interact with other firms located in METU Technopolis in the context of R&D activities and the production of innovation? If yes, how do you interact with other firms? (e.g. know-how sharing, mutual product&service development, technology transfer, mutual talent pool, subcontracting, etc.)	Interdependence & non-linearity and interaction (SI)
5	Do you collaborate with METU, particularly on R&D and innovation-related areas? If yes, how do you collaborate? Do you think that METU has a role in your firm's innovation performance?	Generation, Use, and Dissemination of Knowledge (SI)
6	How do the employees of your firm contribute to R&D and innovation-related activities of the firm? Do they have active roles in decision-making processes?	Employees (VoC)
7	Do you think that business professionals who work in your business area have sufficient competencies and skills to carry out R&D and innovation-related activities? Do they have easy access to training and professional development opportunities?	Vocational Training and Education (VoC)
8	Do you communicate with industrial and business associations operating in your business area? Do these associations support your innovation-related activities?	Industrial Relations (VoC)
9	Is it difficult for you to fund your R&D and innovation-related activities? Do you benefit from government incentives and funds? Do you think that insufficiency of resources has a negative impact on your innovation performance?	Corporate Governance (VoC)
10	Do you think that the institutional structure and innovation ecosystem of Turkey make firms a competitive advantage regarding R&D and innovation-related activities?	Macro-Level Institutional Complementarities (VoC)

2.3.2 Conducting Interviews

Before conducting the interviews, representatives of the selected firms were contacted. Firm representatives who accepted to be a part of the research project were informed with an e-mail that had a consent form (see Appendix 1) attachment. Interviews were planned to be conducted with R&D-related employees of each selected firm. Due to Covid-19 pandemic measures, the interviews were held online. Participants were sent calendar and online meeting invitations through e-mail. The interviews were planned for an hour for each one.

Participants were informed about the research project in detail through the consent form. The consent form includes information about the research project. It covers the objective of the project, research methodology, information about the interview, and data protection approach.

Within the scope of the fieldwork, participants were invited to a semi-structured interview. At the beginning of each interview, the consent form was read aloud to receive the interviewee's approval. It was emphasized that participation in the research project is definitely based on the volunteering principle. Hence, participants were declared to be allowed to end the interview or pass any question they want over at any time during the interview if they would feel uncomfortable. Regarding Bleich and Pekkanen's (2013, p. 103) interview methods table format, a table for interviews is prepared (see Appendix II).

At the beginning of each interview, participants were informed about data privacy and protection. It was particularly pointed out that firm names, participants' personal information and all the information and data to be received during the interviews were going to be sanitized and anonymized in the analysis part of the dissertation. It was also emphasized that all the interviews are enumerated and the data to be received during the interviews were going to be anonymized via the business area of the firm.

In the interviews, the interviewees gave their consent, and online sessions were recorded to make the decoding precise. It was emphasized that the records were only going to be utilized for the purpose of decoding, to be stored in the researcher's computer, in an encrypted folder. And after the interview texts are made, they will be annihilated consequently.

Finally, participants shared the contact information of the researcher, including their personal phone number and e-mail address if they would like to reach the researcher in the aftermath of the interview.

2.3.3 Data Analysis

In this dissertation, as a data analysis method, qualitative content analysis (henceforth QCA) with a deductive approach will be applied. This method is utilized for “describing the meaning of qualitative material in a systematic way” (Schreier, 2012a, p.1). Within the scope of QCA, “a coding frame” is built, the research material is divided into “units of coding” and the coding frame is tried out. Then, the

coding frame is “evaluated and modified,” analysis is done and as a result of the interpretation, findings are presented (Schreier, 2012a, p. 6). In QCA, coding refers to “conceptual coding” (Schreier, 2012b, p. 40). Through coding the data, patterns in the research material are constructed. Owing to coding, underlying indicators in the data set, hence the concepts are examined (ibid). Consequently, the concepts in the data set are “discovered,” “refined” and “linked” in this “iterative process” (Schreier, 2012b, p. 40).

In the QCA there are various methodological approaches such as “inductive,” “deductive” or “abruptive” approaches (Graneheim et al., 2017, p. 30). In the deductive approach, the researcher tests “the implications of existing theories or explanatory models about the phenomenon under study against the collected data” (ibid). This “concept-driven” approach aims to reach a “more concrete level” from “a more abstract and general level” (Graneheim et al., 2017, p. 30).

The data to be analyzed with the QCA can be obtained from various sources such as “interviews,” and “observational protocols”(Graneheim et al., 2020, p. 3). To analyze the data, first of all, “codes/categories are created” (Schreier, 2012b, p. 40). Besides, sub-categories under a category can also be created ” (ibid). The coding frame is based on creating “dimensions” or “main categories” ” (Schreier, 2012b, p. 40). In the QCA approach a category is defined as “a collection of similar data sorted into the same place” (Morse, 2008). Thanks to categorization, a researcher “identifies and describes the characteristics” (ibid). In the QCA a theme is defined as “a unifying ‘red thread’ running through several categories that brings meaning to a recurrent topic or experiences and its various manifestations” (Graneheim et al., 2017, p. 32).

In this analysis, the theme is usually “abstract” and it can be “beneath the surface of the text, but once identified it appears obvious” (ibid). Through themes, “latent and interpretative level” is reached (Graneheim et al., 2017, p. 32).

After describing the themes, the text is interpreted by finding the meaning in the themes (ibid).



CHAPTER III

THEORETICAL FRAMEWORK

3.1 Introduction to the Theoretical Framework

This chapter provides the theoretical framework of this dissertation regarding innovation in mixed market economies. This dissertation is based on two primary research questions which are “How can innovation be possible in Mixed Market Economies (MMEs)?” and “Under which conditions can innovation be possible in an MME?” Regarding my research questions, within the scope of the theoretical framework, I will cover two distinct literatures which are Varieties of Capitalism (VoC) and Systems of Innovation (SI). I will start examining the VoC literature regarding innovation in MMEs. To find the possibility of innovation in unlikely cases of MMEs, I will examine another literature, SI, which provides an alternative approach to the innovation outcome in MMEs.

I first review VoC literature. This literature presents a unique ground to array market economies and manifests an alternative model to a one-size-fits-all type of approach. It provides us clues as to how different varieties of capitalism breed high innovation performance. Strong institutional complementarities at the macro-level which support firms to solve their coordination problems are regarded as key to innovation outcomes. However, this literature overlooks the possibility of the emergence of innovation in the outlier market categories of MMEs altogether. Nor does this literature provide a comprehensive explanation of what makes innovation possible in these markets. Due to its analytical focus on macro-level coordination, VoC

assumes that the lack of macro-level coordination causes lower innovation performance. Through examining this conventional literature, I explore how innovation would *not* be possible in MMEs.

After examining the VoC literature, I then review the Systems of Innovation (SI) literature. The reason why I explore the possibility of MME's innovation outcomes in this literature is that, as it is in VoC, the SI literature also regards innovation as an outcome of market actors' interaction in an ecosystem. Within the umbrella of SI, there are two spin-off literatures which are National Systems of Innovation (NIS) and Sub-National Systems of Innovation (SNIS). Within this scope, I first review National NIS literature to show that scholars of this literature consider innovation outcomes as a result of nation-level coordination and strong institutional complementarities. Given their analytical focus on the ingredients that may produce innovation at the national level, the NIS, too, overlooks the possibility of innovation at the sub-national level. What these two sets of literatures, VoC and NIS, show, however, is that innovation can only be possible through coordination. In fact, in the eyes of these literatures innovation is considered as "a socially and territorially embedded, interactive or reflexive process" (Asheim & Herstad, 2005). Afterward, I review SNIS literature which is more recent literature. It emphasizes that innovation can still be possible despite the lack of strong coordination at the macro-level. Here, it is coordination at the sub-national level and institutional complementarities embedded in the regional/local structures that are the key elements in producing innovation.

This dissertation aims to fill the gap in the VoC literature by exploring the research questions: "How can innovation be possible in MMEs?" and "Under which

conditions can innovation be possible in an MME?” Through linking VoC and SI literatures, I aim to find answers to the possibility of innovation outcomes in MMEs. Consequently, I will conclude that due to the analytical focus of VoC which is established at the macro-level, innovation outcomes yielded in MMEs are disregarded in the literature. Moreover, through examining the literature I will conclude that innovation outcomes in MMEs can be not mostly visible at the macro-level, but at the meso-level.

This chapter is organized as follows: In this chapter, I briefly cover VoC and SI literatures. In the second section (3.2), I review the VoC literature. In this section, I first discuss the coordination problem formulated in VoC and the role of institutions to overcome this coordination problem. And then, I discuss the market types in VoC and their characteristics. Finally, I review the way how innovation is addressed in VoC. In the third section (3.3), I review the SI literature. First of all, I provide an overview of the SI approach. And then I discuss the NIS approach. In the fourth section (3.4) as an alternative to the NIS approach, I discuss the SNIS approach. Finally, in the fifth section (3.5) successful emerging SNIS cases from six MMEs, France, Greece, Italy, Portugal, Spain, and Turkey are covered.

3.2 Varieties of Capitalism (VoC)

3.2.1 Introduction to VoC Approach

While the Varieties of Capitalism (VoC) literature provides us clues as to how different varieties of capitalism breed high innovation performance, it does not adequately address my research questions which are “How can innovation be possible in Mixed Market Economies (MMEs)?” and “Under which conditions can innovation be possible in an MME?” Due to the emphasis on the dual categorization of market economies, the VoC does not provide comprehensiveness on the outlier market categories such as MMEs, but it solely addresses them in a non-profound way.

In the VoC section, I will concentrate on the issue that when it comes to producing high innovation performance, the literature is not clear as to which institutions play key roles, their coordinating functions, and how and at what level they do so, hence for the MME case, the literature does not provide concrete answers for the elements which make innovation possible in these market economies. And in this context, at the end of the section, I conclude with three points. The first point is that the VoC literature is not explicit in identifying what the key institutions are to produce innovation in a market economy. Second, the VoC literature does not specify which coordinating functions institutions play in producing high innovation performance. And finally, the literature categorically assumes that innovation is coordinated at the national level, therefore, a market economy that is not akin to LMEs or CMEs will not perform highly in innovation outcomes.

First of all, in 3.2.2. I will briefly cover the coordination problem in VoC and then in 3.2.3, I will address the role of institutions to overcome the coordination problem. Afterward, in 3.2.4 I will go into the details of VoC's bifurcation of market economies which are Liberal Market Economies (LMEs) and Coordinated Market Economies (CMEs). Subsequently, in 3.2.5 I will cover other market economies beyond the ideal typical market economy classification and finally, in 3.2.6, I will cover market economies and innovation.

3.2.2 VoC and the Coordination Problem

Comparative typologies of capitalisms (CC) which were led by Andrew Shonfield, Michael Albert, Peter Hall, and David Soskice inspired many other related studies (Nölke & Vliegenthart, 2009). The idea behind comparing different capitalisms was that the matrices of institutions of capitalism do differ from one to another. Some of these institutional matrices perform better than others. The key ingredient of better performance was “institutional complementarities” where “two institutions can be said to be complementary if the presence (or efficiency) of one increases the returns from (or efficiency of) the other” (Hall & Soskice, 2001, p. 17).

The CC literature allowed many other scholars to go beyond the neoliberal assertions of the singular logic of capitalism – that there is (and should be) one way of organizing an economy, and that is along the textbook liberal lines. In that respect, the CC literature provided an alternative model to the Anglo-American Model (Crouch & Streeck, 1997). The mainstream economic literature assumes that the

Anglo-American model is the only path to economic success and that nations (do and should) converge onto the American model. It is assumed that powerful pressures, such as globalization, “compels countries to deregulate their labor markets, welfare, and industrial relations systems, entailing convergence on an Anglo-American model” (Royo, 2007, p. 47).

Peter Hall and David Soskice provided a model titled *The Varieties of Capitalism* (2001) which challenged the mainstream economic literature exclusively showcasing the Anglo-American Model. In the VoC literature, there is no single economic model that the rest would converge onto, but two. In the VoC classification, advanced market economies are categorized as either Liberal Market Economies (LMEs) or Coordinated Market Economies (CMEs).

In VoC, firms are regarded as profit-oriented entities that turn their capabilities into goods and services and their success is dependent on their relationship with the internal and external stakeholders. In a market economy, firms establish relationships with their employees and other stakeholders in the market such as “suppliers,” “clients,” “collaborators,” “stakeholders,” “trade unions,” “business associations” and “governments” (Hall & Soskice, 2001, p. 6).

VoC assumes that firms in a market economy come across a coordination problem. Under the circumstances that they would establish “efficient coordination” with other stakeholders they are assumed to overcome this coordination problem. There are “two modes of coordination” defined in VoC. The first one is related to the market coordination that firms coordinate with other stakeholders via “competitive markets.” And the second one is related to the non-market coordination that firms

coordinate with other stakeholders through strategic interaction (Hall & Gingerich, 2009, p. 452).

Firms' ability to coordinate with the market actors is regarded as crucial to overcoming the coordination problem. The approach makes a correlation between the coordination abilities of firms and their success. From the VoC perspective, firms must develop relationships in five spheres to resolve this coordination problem, which is "industrial relations," "vocational training and education," "corporate governance," "inter-firm relations" and "employees" (ibid). Hence, the way how firms in a market economy respond to the coordination problems piled around these five areas identifies the type of market economy (Blyth, 2003, p. 216; Bohle & Greskovits, 2009, p. 360). Besides, the characteristics of institutions in a market economy identify "the nature of coordination" (Hall & Gingerich, 2009, p. 454).

When it comes to competencies firms should establish to overcome the coordination problem, five areas identified above are defined. First of all, VoC assumes that firms in a market economy should establish competency in "corporate governance," hence "access to finance" (Blyth, 2003, p. 216). In the VoC approach, it is pointed out that "corporate governance" based coordination problems arise in the market and access to financial resources and assurance for the return on investments are significant for firms to "secure their funds" (Hall & Soskice, 2001, p.7). Secondly, firms should establish competency on labor-related issues such as working conditions, and wage bargains which affect the productivity level of firms. Hence, to coordinate labour-related issues, they should establish competence in "industrial relations." Third, the VoC approach assumes that firms in a market come across

“vocational training and education” related coordination problems. It suggests that firms should establish competency in equipping the workforce with suitable skills at the optimum point to avert the related coordination problem. In addition to those, fourth of all, “inter-firm relations” is regarded as another sphere. Firms form relationships with other firms in the market to set market standards, reach technology and collaborate with each other. In order the firms to be more competitive and technologically advanced, “inter-firm relations” is regarded as a significant sphere to establish competency. And finally, in the VoC, it is emphasized that firms come across internal coordination problems. Especially, to avert “adverse selection,” “moral hazard,” and “information-sharing”- based problems. Therefore, it is suggested firms establish competencies in their “employees” (ibid).

3.2.3 The Role of Institutions to Overcome the Coordination Problem

In the VoC approach, institutional complementarities are portrayed as the elements which support firms to overcome their coordination problem. Institutions and organizations are regarded as significant components that provide support for resolving firms’ coordination problems. Hall & Soskice define the institution as:

A set of rules formal or informal, that actors generally follow, whether for normative, cognitive, or material reasons, and organizations as durable entities, which formally recognized members, whose rules also contribute to the institutions of the political economy. (Hall & Soskice, 2009: 9)

By definition, in VoC, the institution is identified as restrictive. However, fundamentally institutional layout in a market is regarded as complementary to firms for them to acquire strategic capacities (Hall & Soskice, 2009, p. 12). Institutions are

considered supporting organizations in which firms in a market “coordinate on equilibrium strategies that offer higher returns to all concerned” (Hall & Soskice, 2001, p. 10). Within the framework of VoC, institutions are positioned as compensator organizations. It is assumed that in the market, firms come across uncertainties about the behavior of other actors, and thanks to the institutional layout they can make credible commitments. Interactions and complementarities among institutions themselves are regarded vital to function better to support companies in a market as well (Howell, 2003, pp. 105-106).

Institutions perform as stabilizers thanks to their reassuring role in the ecosystem. The institutions in a market typically function for enabling the “exchange of information,” “monitoring behavior” and “sanctioning of defection from cooperative endeavor.” “Business associations,” “trade unions,” “extensive networks of cross-share-holding” and “legal” and “regulatory systems” like institutions are regarded as the organizations which make it easier for firms to coordinate through “information sharing” and “collaboration.” It is assumed that the market forces cannot provide a coordination ground without a proper institutional layout by themselves (Hall & Soskice, 2001, p.10). Therefore, in VoC, institutions are considered important not only because they “distribute power” or “sanction behavior,” but also because they “facilitate the flow of deliberation and information among actors,” “permit decentralized cooperation” and “solve familiar collective action problems” (Howell, 2003, pp. 105-106). The coordinating role of institutions is more dominant compared to its sanctioning role.

In addition to their stabilizer role, institutions represent restrictions for the companies in a market economy as well. Actors in the market economy are restricted by “rules and institutions,” however, they are “looking for ways to make institutions work for them as well (Hall & Thelen, 2009, pp. 9-10). VoC assumes that the firms positioned in a political economy face various coordinating institutions and institutional structure conditions for the strategies of companies. The institutional layout is not regarded as “determining” the corporate strategies of firms located in a political economy itself, (Hall & Soskice, 2001, p. 15) however it conditions them. By implication, firms’ role to identify their corporate strategies is regarded as limited and the institutional framework to which they are exposed is considered restrictive. In different institutional contexts, firms acquire particular types of corporate strategies. The direction of corporate strategies is correlated with the characteristics of institutional layouts. In VoC understanding, firms are surrounded by nation-specific institutional factors which condition the actions of firms. Hence, the firm is considered the building block of the political economy which is inextricably bounded by the institutional structure within the ecosystem.

In VoC, the companies are identified with the restrictions that appear in different institutional settings, but also the institutional layouts are regarded as “interlocking ensembles” (Howell, 2003). The institutions in a market are considered that they are reinforcing each other (ibid). Hence, the complex engagement of the actors in a market economy determines the patterns of the market at a higher level.

Hall and Soskice (2001, p. 18) point out that “nations with a particular type of coordination in one sphere of the economy should tend to develop complementary

practices in other spheres as well.” Hence, due to the synergy created in the markets, market economies have a “comparative institutional advantage” (Hall and Soskice, 2001, p. 37). The institutional setting of a market economy supports firms to perform business activities more efficiently. Besides, the complementarities matter the institutions rarely perform well on their own, “in isolation” (Howell, 2003, p. 106). Hence thanks to the “multiplicity of institutions” that mostly “nest inside others,” institutions perform as “functional substitutes” for each other (Hall & Thelen, 2009, p. 10).

In the VoC understanding, the differentiation of institutional setting and “institutional configurations” determine the characteristics of the markets (Blyth, 2003, p. 216; Jackson & Deeg, 2008, p. 541; Schneider et al., 2010, p. 248) which is visible on their economic performances and sectoral specialization (Amable, 2003a, p. 23; Boschma & Capone, 2015, p. 1902; Boyer, 2004, p.12; Geffen & Kenyon, 2006, p.18; Witt & Jackson, 2016, p. 779). Hence, the way how firms cope with the coordination problem is regarded as related to the institutional setting they are surrounded (Jackson & Deeg, 2008, p. 546; Witt & Jackson, 2016, p. 780; Allen, 2006b, p. 48).

If markets are imperfect with significant institutional support, they mostly depend on “strategic coordination,” while if they are “fluid,” firms mostly depend on “market coordination” (Hall & Gingerich, 2009, p. 452; Hall & Thelen, 2009, p. 13). In Coordinated Market Economies (CMEs), the focus is the “accumulation of specific skills and patient investment,” while in Liberal Market Economies (LMEs), the focus is “general skills and fast adaptation to changing market conditions”

(Amable, 2016, p. 83). Hence, through the institutional setting of CMEs, “incentives” to enable “investment in specific skills” are provided and long-term market strategies are put into practice while in LMEs the institutions support the efficient and competitive outcomes to be generated (ibid).

VoC is not an “agent-centered” approach but more of a “structuralist approach” (Hay, 2005, p. 111) (and in the VoC “strategy follows structure” (Allen, 2006a, p. 13). The VoC addresses the firms in an ecosystem at different levels; “micro-foundations,” “meso institutions” and “macro regimes” (Blyth, 2003, p. 216). Hereby the interaction between agents and institutions is a wider structural framework representing the basis of the VoC approach (Allen, 2006a, p. 32; Blyth, 2003, p. 216).

Institutions that are regarded as “sets of regularized practices with a rule-like quality” shape the behavior of political actors, hence market economies (Hall, 2009, p. 204). Furthermore, in the course of time, due to changes in institutions, the market economies may gain new characteristics as well. Institutions can change “slowly,” “incrementally,” “frequently,” or “abruptly” (ibid, p. 219). Besides, institutions change due to exogenous factors such as globalization. In the comparative political economy, the institutional change “in response to the opening of world markets associated with globalization” is also addressed (Hall & Thelen, 2015, p. 7). As a result of economic globalization, CMEs have experienced extensive deregulation though it is assumed in the literature that CMEs “perform poorly in deregulation reform” (Pierre, 2015, p. 908). On the other hand, due to “multinational corporate

behavior,” new organizational structures emerged as new actors in the market economies (Detomasi, 2015, p. 697).

While in certain cases, these institutional changes are regarded as “non-trivial” due to their limited impact over a systematic change in a market economy, in certain other cases they may be relatively more significant due to their overall impact. For instance, in the early 2000s, the reforms made in Germany on certain areas such as “industrial relations,” “vocational training” and “social policy” were regarded as non-trivial, in the context of a potential transition to the Anglo-Saxon model, since it did not create a big impact (Hall & Thelen, 2009, p. 25). These broad market economy categories mostly maintain their characteristics. However, in certain other cases, such as in France, the transition from “dirigiste policies” to “market-oriented” coordination in the 1980s had a big impact on the characteristics of the market economy since it acquired a more liberal outlook though it maintained its mixed economy characteristics (ibid, p. 26).

In the literature, certain studies address the direction of institutional change in certain market economies and question their impact on the characteristics of market economies. For instance, in Eerola’s study (Eerola, 2023) due to changing patterns in labor policies in Finland which is a typical CME, the change of CME characteristics of the Finnish market economy is addressed. Hence, it is concluded that the Finnish market acquired more LME-like characteristics in its labor policy. In another study, Campbell and Pederson (2007) discuss that identifying Denmark as a pure CME is misleading. They argue that due to changes in certain areas in the Danish political economy such as “labor market,” “vocational training” and “industrial policy,” it

acquired more LME-like characteristics as well. Hence, the identification of market economies is varied due to continued institutional changes and exogenous macro trends.

3.2.4 Ideal Typical Market Economies

3.2.4.1 Liberal Market Economies (LMEs)

In the VoC literature, LMEs are categorized as market economies in that firms “coordinate their activities primarily via hierarchies and competitive market arrangements” (Hall & Soskice, 2001, p. 8). Relationships in these markets are mostly determined by the “arm’s-length exchange of goods and services” (ibid). Relationship between firms and other actors is primarily coordinated through competitive markets (Hall & Gingerich, 2009, p. 452). Hence, regarding demand and supply dynamics in a market economy, market actors try to maximize their utilities rationally. Markets are led by market forces and market relationships which are shaped by “competition” and “formal contracts” (Hall & Soskice, 2001, pp. 8-9). LMEs are mostly identified with “neoliberal policies, radical innovation, new sectors of the economy” (Crouch, 2005, p. 442). In addition to that LMEs are associated with “future-oriented industries and service sectors” (ibid).

In LMEs, both financial and industrial relations are coordinated through the market structure (Hall & Soskice, 2001, p. 19). Besides, the institutional structure is complementary to market coordination. The USA is regarded as the ideal-typical LME case (Hall & Soskice, 2001, p. 27). Other significant LMEs are “the United Kingdom, Ireland, Canada, Australia, and New Zealand” (Hall & Gingerich, 2009, p.

453). LMEs, such as the USA economy, “are embedded into thick markets largely unmediated by collective organizations and unhampered by regulations” (Schneider et al., 2010, p. 249). Besides, a typical LME would have a “market-driven financial system,” “flexible use of external labor markets,” “generalist education and training systems,” “low levels of networks and alliances among firms” and “management-driven, top-down decision-making structures inside firms” (Witt & Jackson, 2016, p. 781).

Under the circumstances that there are economic challenges and current activities are “threatened,” “holders of mobile assets,” for instance, “workers with general skills” and “owners of capital” would change their directions and move to new activities (Hall & Gingerich, 2009, p. 477). A fluid market structure allows these shifts to happen.

In LMEs, coordination problems are resolved through market coordination. When it comes to corporate governance / financial systems, in LMEs “current earnings” and “price of firms’ shares on equity markets” are considered significant. Hence, the financial sustainability and security of a firm in these markets are related to its financial success and profitability. LMEs do not have “close-knit corporate networks” that would make them independent of market valuation to ensure financial security. Their valuation is mostly dependent on market value, hence “publicly available information” and “balance sheets.” Besides, M&A activities, including “hostile takeovers” are allowed and tolerated by regulation mechanisms. Top managements gain more benefits through “compensation systems” when there is an increase in “net earnings” and “share prices” (Hall & Soskice, 2001, pp 27-29).

In terms of internal structure, top managements in firms have “unilateral control over the firm” which makes “hire and fire” easier (Hall & Soskice, 2001, pp. 29-30). Top management in firms has “substantial authority over all aspects of the firm” which limits employee participation. (Hall & Gingerich, 2009, p. 453). When it comes to industrial relations, the market relationship is mostly established between “individual worker” and “employer.” Trade unions are not powerful to represent employees. Besides, firms are not required to be represented in work councils. A low level of representation of employees in representative bodies leads to wages being controlled by market forces (Hall & Soskice, 2001, pp. 29-30). In LMEs “labor-management relations are contentious,” hence strategies regarding a “high-skilled productive workforce” are not aimed (Martin, 2005, p. 55).

In terms of education and training systems, LMEs mostly have education institutions that concentrate on “general skills.” These institutions also organize vocational training. However, in LMEs sector-specific, specialization-based trainings and apprenticeships are not common. Due to the rapid exchange of labor among different firms, firms do not tend to invest in their employees’ acquisition of skills and competencies. Hence, “general skills” which can be utilized for various jobs are preferred (Hall & Soskice, 2001, p. 30). Due to “weak industry associations” firms do not hold “collaborative training programs” (Hall & Gingerich, 2009, p. 453).

When it comes to “inter-firm relations,” in LMEs firms mostly rely on “market relationships” and “formal contracts.” Besides, “antitrust regulations” that are designed to avoid firms to fall into disagreement are common. In these competitive environments, technology transfer is done indirectly thanks to the

mobility of employees. Due to fluid labor markets, employees “bring their technical knowledge with them” when they start working for other firms. Hence, technology transfer takes place via fluid-labor markets and “licensing” and “sale of innovations” (Hall & Soskice, 2001, pp. 30-31). Due to the lack of strong business associations “collective standard-setting” is also rare (ibid). Standards are identified by “market races” (Hall & Gingerich, 2009, p. 453). “Inter-firm collaboration” and “research consortia” are not common when it comes to technology transfer. (Hall & Soskice, 2001, pp. 30-31).

3.2.4.2 Coordinated Market Economies (CMEs)

In the VoC literature, CMEs are categorized as market economies in that firms resolve their coordination problem through non-market coordination (Hall & Soskice, 2001, p. 22). In CMEs, “coordination takes place within the industrial sector or branch” (Jackson & Deeg, 2008, p. 557). Hence, coordination in CMEs can be regarded as “strategic coordination through investment in specific assets” (Jackson & Deeg, 2008, p. 547). Besides, in terms of “shaping economic action,” “social and political institutions” have active roles in CMEs. And it is related to “social democracy, incremental innovation, declining economic sectors, and non-Anglophone countries” (Crouch, 2005, p. 442). Hence rather than depending on “market mechanisms,” CMEs depend on “collaborative risk-sharing arrangements to generate to deliver innovation and growth in living standards” (Geffen & Kenyon, 2006, p. 5).

Firms in CMEs “are embedded into markets that are mediated by collective institutions such as trade unions, business associations, and corporatist organizations”(Schneider et al., 2010, p. 249). These collective institutions create a positive externality for firms through a network for them to resolve their coordination problems. In contrast to firms in LMEs, firms in CMEs have more interaction with “trade unions,” “suppliers of finance” and “other actors” (Hall & Gingerich, 2009, p. 452). Firms in CMEs are “closely connected by dense networks of cross-shareholding and influential employer associations” (ibid). Hence, through these networks, firms establish a “reputation.” Contrary to LME firms’ focus on “shared value,” firms in CMEs mostly focus on “reputation” (ibid).

Germany is identified as the ideal-typical CME but in addition to Germany nine other countries are also categorized as typical CMEs which are “Japan, Switzerland, the Netherlands, Belgium, Sweden, Norway, Denmark, Finland and Austria” (Schneider & Paunescu, 2012, p. 732).

When it comes to “corporate governance / financial systems” in CMEs, they have a “bank-led financial system” (Witt & Jackson, 2016, p.781). Access to finance does not rely on “publicly available financial data” and “current returns.” Hence finance in CMEs mostly relies on “patient capital.” “Patient capital” enables firms to make plans for the long term and they would be resilient to financial fluctuations. Thanks to business networks and associations firms have access to information about the other firms. Firms’ strategies are based on “tax provisions, securities, regulations, and network of cross-shareholding” (Hall & Soskice, 2001, pp. 22-23).

In terms of the “internal structure of the firm,” firms in CMEs have a different approach. Top management of the firms does not have “unilateral” control over the firm. Employees are represented well at “supervisory boards” which lead to a more collaborative decision-making process. Besides, due to “long-term employment contracts” and relatively less tendency for rapid hire&fire policies, security, and stability are prioritized in CMEs. Firms are not solely profitability-oriented (Hall & Soskice, 2001, p. 24). In addition to that thanks to “consensual decision making inside firms” there is alignment between management and employees (Witt & Jackson, 2016, p. 781).

In CMEs, “industrial relations” have a distinct pattern. They have strong trade unions and business associations. Hence, due to “industry-level bargains,” wages are standardized in different industries. The standard setting for wages prevents a high level of mobility across firms. In addition to that thanks to “employee representatives,” employees’ rights are aimed to be protected specifically in “working conditions” and “lay-off” areas (Hall & Soskice, 2001, pp. 24-25). CMEs have “stronger internal labor markets based on employment protection” (Witt & Jackson, 2016, p. 781).

In terms of “education and training system,” CMEs mostly have education institutions that concentrate on “high industry-specific skills” and “firm-specific skills.” Germany, a typical example of CME, has a “publicly subsidized training system.” Besides, apprenticeship is common in CMEs. Thanks to “training protocols” generated by business associations, the “free-rider problem” is dissolved (Hall & Soskice, 2001, pp. 25-26).

When it comes to “inter-firm relations,” in CMEs firms mostly rely on relationships through business associations. Business associations support firms to reach new technologies and sector-specific information. They function as an intermediary organization to coordinate relationships between the state and firms. Besides, firms collaborate with other firms and “quasi-public research institutes” on research projects. Thanks to “common technical standards” and “common knowledge base” a sector-specific technical information pool is created. Hence, technology transfer is achieved via mutual R&D projects. Due to “inter-firm collaboration,” firms mostly differentiate their product portfolios and concentrate on “niche production” to gain competitive advantage (Hall & Soskice, 2001, pp. 26-27).

3.2.5 Other Market Economies Beyond Ideal Typical Market Economy Classification

3.2.5.1 Mixed Market Economies (MMEs)

VoC literature provides a proper ground to array national economies in two modes of coordination. Through providing an alternative ground to the one-best-way of capitalist approach, two ideal-typical market economies, LMEs, and CMEs are identified in the VoC. It opened a new way for the Comparative Capitalisms literature, yet it has brought disbelieves whether there are only two modes or not. Despite it created a fruitful base to discuss national economies, the VoC literature came in for criticism as well due to the bifurcation of market economy classification. The VoC’s ideal-typical bifurcation of market economies is criticized by many

scholars and the dual convergence is found “reductive,” “overly mechanistic” or “static” (Boschma & Capone, 2015; Boyer, 2005; Crouch, 2005; Goodin, 2003; Hay, 2005; Pontusson, 2005; Schneider & Paunescu, 2012) and even over-functionalist against institutional change (Crouch, 2005; Hall & Thelen, 2009).

The bifurcation of VOC’s market classification has tried to be extended by several scholars as well. Schneider's (2009) hierarchical market economy (HME) classification aimed to identify the market type in Latin American countries while Nölke and Vliegenthart’s (2009) dependent market economy (DME) classification aimed to identify the market type in East Central Europe.

Besides, in distinct literature, State Capitalism, economies with extensive involvement of states which are mostly neglected in the VoC literature, are widely addressed. In the State Capitalism literature, “the widespread influence of the government in the economy, either by owning majority or minority equity positions in companies or by providing subsidized credit and/or other privileges to private companies” is covered (Wright, et al., 2021; Musacchio, et al., 2017). This literature addresses the economies with extensive state involvement which are not categorized within the scope of the VoC literature. For instance, “the rise of Chinese capitalism under the aegis of its party state,” “the patrimonial forms of capitalism” based on oil and gas revenues in Russia and Kazakhstan or Arab Gulf economies and economies with “large state-owned sectors” such as Egypt and Algeria are addressed in the State Capitalism literature (Alami & Dixon, 2023, p. 78). Hence, the State Capitalism literature provides an alternative explanation for the market economies which do not fit the bifurcation of VoC’s ideal-typical market categorization.

In VoC, in addition to ideal-typical market economies, LMEs, and CMEs, the third category called Mixed Market Economies (MMEs) or hybrid (Mediterranean) market economies are classified as well, yet they are not detailed as LMEs or CMEs (Akkermans et al., 2009, 183; Hall & Gingerich, 2009, p. 478; Molina & Rhodes, 2007). According to Hall and Soskice (2001, p. 21), there are several countries such as Greece, France, Italy, Portugal, Spain, and Turkey which are in ambiguous positions when it comes to classifying market economies. Hence, they are classified as MMEs. The countries under this third category are marked with “large agrarian sectors” and “extensive state intervention” in their histories (ibid).

The MME is mostly identified with “the existence of a large set of family-based small firms,” “cross-participation in firms’ governance” and “prominent role of the state in the economy” (Vallejo-Peña & Giachi, 2018, p. 24). Particularly for France, Italy, and Spain “tight family and state ownership” are considered as common characteristics (Moerland, 1995, p. 44). This type of market economy is also referred to as a “pragmatic system” by De Jong (1995, p. 402) which is an alternative to the “free market economy” and “social market economy.” In this system, “state enterprise and government interference” are portrayed as significant characteristics. Lack of “monetary stability,” “social protection,” “cooperation between social partners,” and “equality of incomes and opportunities” are regarded as the characteristics of this type of system. On the other hand, “public policy interference” is regarded as a key determinant in the system (ibid). MME is portrayed as a “continental European model” which has “more employment protection and less social protection” (Vallejo-Peña & Giachi, 2018, p. 24). Hence, due to these primary characteristics, these markets have a “relatively low level of

product-market competition” and “more regulated labor markets” which lead to rigidity in terms of “governance and organization of employment” (ibid; Amable, 2003b, p. 175).

Amable (2003b, p. 175), points out that Mediterranean capitalism has several characteristics such as “regulated product markets,” “regulated labor markets,” “bank-based system,” “limited welfare state” and “weak education system.” Besides, these market economies have a “comparative institutional advantage” in more traditional industrial areas such as “non-mineral products, agriculture, other transport” (Amable, 2003c, p. 208). When it comes to R&D, “public financing of R&D” is regarded as a characteristic of this type of market (ibid).

Despite that LMEs and CMEs are discussed and specified in detail, the MMEs, the third category, are mostly neglected and understudied within the scope of the VoC literature. In the VoC literature which is studying the advanced industrial countries, these six Mediterranean countries are classified as “underachievers” to a certain extent (Glassmann, 2016). Within the framework of the VoC approach, these “underachiever” countries are delivering a “poor performance” compared to LMEs and CMEs since they have “incoherent institutional set-up preventing a clear orientation towards either one of the two ideal types of capitalism: the LME or CME” (Glassmann, 2016, p. 36). The most distinguishing characteristic MMEs have is that state has a distinctive role in these market economies. In addition to that, in these “deviant” cases (Streeck, 2016, p. 244) there is a “high degree of institutional incoherence” and “apparent absence of complementarities” (Molina & Rhodes, 2007). The reductionist approach of VoC is criticized by many scholars since it

neglects the role of the state in the analysis (Howell, 2003, p. 110; Regini, 2003; Schmidt, 2003, 2008, 2009; Ebbinghaus, 1999; Taylor, 2004, p. 605). In the literature, it is also discussed that even in CMEs “state support is essential for maintaining coordination today in the face of new pressures,” thus the role of state and state policies are inevitably visible in even European CMEs (Martin & Thelen, 2007, p. 4.)

Schmidt (2003, p. 552) points out that varieties of capitalism may not be limited to two varieties such as LMEs and CMEs but there are “at least three varieties of capitalism.” She argues that if market capitalism (LME-alike) is typically matched with the United Kingdom case and managed capitalism (CME-like) is typically matched with the German case; the French case which may be categorized neither as market capitalism nor managed capitalism cannot be arrayed on this reified binary classification. However, the third category named state capitalism may be convenient as a third way of classification, hence for France. The market reforms made in France transformed the state-led capitalism characteristics of the country into more state-enhanced characteristics, thereby a hybrid variety has emerged. The role of the state is diminished, despite that it is still active. According to Schmidt, the macro-trends that emerged in the post-war era such as “liberalization of financial markets,” “privatization” and “deregulation” has led to a conclusion among some scholars that state capitalism has lost its “empirical validity,” state capitalism has still been significantly exercised despite that the “direct influence” of it has been diminished. Hence, through analyzing a country case, Schmidt criticizes the firm binary VoC categorization (ibid).

Ebbinghaus (1999, p. 20) points out that though the “Southern model” has several similar characteristics to the “center model,” it has some distinct characteristics due to “different weight of state intervention.” According to him:

These Southern economies are marked by a legacy of belated or incomplete transition from an agrarian society to industrialization, a large small medium-sized firm sector, and a larger role of the state via nationalized banks, state-controlled conglomerates, or public subsidies in modernizing the economy for lack of private capital... With the exception of France and partly Italy, the Southern welfare states were relatively late and incompletely developed, public spending tended to follow a political clientelist motivation but also remained residual due to still familistic and subsidiaristic principles of self-support. (Ebbinghaus, 1999: 20-21)

According to Howell (2003, p. 110) VoC approach “identifies a secondary role for states and is critical of earlier theoretical approaches that assigned a central role to state action.” However, it still regards the “nation-state” seriously due to its power in “rule-making” and “reinforcing coordination.” Its analysis is limited to the national level rather than “sub-national or supranational levels.” It has a “thin notion of politics and state action.” Thus, the state is not identified as a separate actor which has “distinguishable interests” (ibid). Taylor (2004, p. 605) emphasizes that VoC scholars avoid the state concept. They regard the firm “as the locus of trade and production in the capitalist economy.” Hence, not the state but the firm is considered as the unit of analysis in VoC (ibid).

According to Molina and Rhodes (2007, p. 225) MMEs in Europe have a “mixed character.” They have “different logics of coordination and forms of actor interaction.” Molina and Rhodes emphasize that:

They too are fragmented, unevenly developed, subject to politicization and clientelism, and mix Bismarckian (pensions) and liberal (health system) characteristics. Electoral systems range from the more majoritarian (Spain, Portugal, and Greece) to the proportional (Italy), and further complicate

attempts to generalize correspondences between production regimes, welfare states, and political institutions. (Molina & Rhodes, 2007: 225)

Hence, due to their characteristics, MMES is assumed to “lack the pre-conditions for beneficial complementarities and positive spillovers” (Amable, 2003b; Molina & Rhodes, 2007, p. 226). Besides, it is also assumed that in MMEs, “market and non-market forms of coordination” do exist simultaneously (Molina & Rhodes, 2007, p. 227). MMEs are regarded as market economies that do not have strong institutional complementarities. Thus, they are regarded as underperformers compared to “pure LMEs and CMEs” (Bohle & Greskovits, 2009, p. 360; Hall & Gingerich, 2009, pp. 459-460; Hall & Soskice, 2001; Jackson & Deeg, 2008, p. 547; Malik, 2017, pp. 324-325; Nölke, 2018, p. 271). In terms of industrial relations, firm structure, and corporate governance, MMEs display a different outlook compared to CMEs and LMEs (Hall & Gingerich, 2009). They have an autonomous market with a higher impact of regulation and state mediation and the state has a gate-keeping role in the market. State regulations may create efficiencies in the market and they may end up in “inefficient equilibriums” (Molina & Rhodes, 2007). Besides, due to a lack of strong institutional complementarities, these market economies that state has an active role in the economy are assumed to “get into economic trouble sooner or later” (Nölke et al., 2019, p. 24).

MME as the third market economy category identified in VoC is regarded underperformer due to a lack of strong institutional complementarities and macro-level coordination. Furthermore, it is neglected and understudied since it is considered a deviant and outlier category.

3.2.5.2 Hierarchical Market Economies (HMEs)

MME is not the only market economy category that is regarded outlier in VoC. However, Hierarchical Market Economy (HME) is provided as an alternative market economy category to examine “distinctive institutional foundations of capitalism in Latin America” (Schneider, 2009). Hence, the bifurcation of VoC is not regarded as sufficient to analyze the Latin American case since it does not fit the bipolarity of VoC. And HME is regarded as distinct in terms of the way how firms cope with the coordination problem in this type of market economy.

According to Schneider (2009), HMEs have four core features which are “diversified business groups,” “multinational corporations (MNCs),” “low-skilled labor” and “atomistic relations.” First of all, in terms of corporate governance, HMEs have big family-owned private firms. Hence these “diversified business groups” have subsidiaries in various areas and they have “hierarchical control over dozens of separate firms” (Schneider, 2009, p. 558). Thus, a few business groups have big shares in these countries' economies. Firms are mostly piled under these big business groups and fundamentally economies in Latin American countries are led by these firms. Second, in HMEs foreign firms have a big impact on economies as well. These multinational corporations (MNCs) do “direct investments” in these Latin American countries. Besides, they do “technology transfer,” provide “capital for investment” and support vendors and supply chains in the market (Schneider, 2009, p. 560). Third, HMEs have low-skilled labor. Due to low levels of education In Latin America, these markets have less trained workers on average. Not only conventional educational participation levels in HMEs are low but also vocational and technical

trainings are limited. Hence, this “low-skilled labor” problem creates a more “generic coordination problem” in HMEs (Schneider, 2009, p. 564). Fourth, HMEs have atomistic labor relations (Schneider, 2009, p. 561). Employees do not have long-term contracts, hence the labor market is relatively fluid. The labor markets have high turnover rates. There are no strong trade unions as it is in CMEs. Employees are not represented on boards in companies. Thus, due to the lack of strong intermediary mechanisms among employers and employees, there is no powerful collective bargaining in these markets (Schneider, 2009, pp. 560-563).

The formulation of the HME category allows more varieties to be included in the extended VoC literature. In addition to that, though it is methodologically utilizing the same areas that firms should establish competencies to overcome the coordination problem, it provides an alternative market economy category to the bifurcation of the ideal-typical market identified in VoC.

3.2.5.3 Dependent Market Economies (DMEs)

Not only MMEs and HMEs but also DMEs are presented as alternative market economy categories in the extended VoC literature. The countries located in East Central Europe (ECE), such as Czechia, Hungary, Poland, and the Slovak Republic are considered as DMEs (Nölke & Vliegenthart, 2009). According to Nölke and Vliegenthart (2009, p. 671), these countries completed the transition periods and they acquired a distinct position in the global political economy context. Besides, these ECE countries do not fit the ideal-typical types of VoC literature.

DMEs are assumed to have distinct advantages in “the assembly and production of relatively complex and durable consumer goods” (Nölke & Vliegenthart, 2009, p. 672). Besides, it has certain features such as the “provision of capital via foreign direct investment,” “the transfer of technological innovations within transnational enterprises” and “skilled but cheap labor” (ibid). First of all, foreign direct investments in EECs determine the fundamental characteristics of this market category. Investments in these countries are mostly funded through foreign capital. (Nölke & Vliegenthart, 2009, p. 680). Second, owing to transnational companies (TNCs) R&D activities are conducted in these economies, and technology is transferred via these companies (Nölke & Vliegenthart, 2009, p. 688). Third, skilled and cheap labor attracts TNCs to perform more business activities in EECs.

In DMEs, in terms of corporate governance, “foreign ownership” is significant. Hence, the subsidiaries located in EECs are mostly directed by headquarters in the West (Nölke & Vliegenthart, 2009, pp. 682-683). When it comes to industrial relations, labor does not have an active role in the bargaining process to set wages and they relatively have a weaker role. They are not represented in employee organizations (Nölke & Vliegenthart, 2009, pp. 684-685). In terms of education and training systems, DMEs are more advantageous compared to HMEs since vocational training in EECs meets the needs of TNCs (Nölke & Vliegenthart, 2009, p. 686). Hence, thanks to vocational training TNCs run their operations in these countries by finding the required human resources.

Similar to the HME category, the formulation of the DME category extends the scope of VoC for different market economies which have distinct characteristics.

In DMEs, competencies required to overcome the coordination problem are mostly established through external complementarities. Hence due to a lack of market-specific institutional complementarities, these markets are mostly dependent on external sources.

3.2.6 Market Economies and Innovation

3.2.6.1 Innovation in CMEs and LMEs

First of all, innovation has different meanings in different contexts. At the product and service level, innovation refers to “new or improved goods and services,” while at the process level, it refers to “technological or organizational ways of producing goods or services” (Allen, 2013; Edquist, 2006). According to Porter, there is no “single best pattern of innovation,” but “different types of innovation exist, organizational or technical, process or product, and incremental or radical” (Jackson & Deeg, 2006, p. 20; Porter, 1990). In the Post-Fordist context, innovation is defined as a “socially and territorially embedded, interactive process, which cannot be separated from its institutional and cultural contexts” (Asheim, 2007).

Allen (2013, p.778) points out that different institutional settings may have an influence on the innovative competencies of firms in a different way. Since firms are “embedded in regional economies, they are dependent on a favorable economic and industrial environment” (Asheim, 2007). Hence their activity’s innovative characteristics are not independent of the ecosystem that they are a part of. Many scholars point out that the firm's innovative capabilities are widely regarded as being

influenced by institutions (Allen, 2013; Coriat & Weinstein, 2002; Edquist, 2004; Werle, 2012; Whitley, 1999)

In VoC, a firm's capacity for innovation is regarded as crucial for maintaining success in the long run (Hall & Soskice, 2001, p. 38). In the literature, in terms of innovation, a distinction is drawn between radical innovation and incremental innovation. Radical innovation is identified with LMEs and incremental innovation is identified with CMEs. While radical innovation is defined as "innovation which entails substantial shifts in production lines, the development of entirely new goods or major changes to the production process" (ibid), incremental innovation is defined as "continuous but small scale improvements to existing product lines and production processes" (ibid, p. 38-39). Hence, in the VoC it is assumed that "the positive interactions or complementarities between CME-like institutions favor incremental innovation" and "the positive interactions between LME-like institutions favor radical innovation" (Schneider & Paunescu, 2012a, p. 734). VoC assumes that different institutional settings create different competitive advantages which yield different results in terms of innovation outcome (Boschma & Capone, 2015, p. 1903). Thus, different institutional settings create "cross-national patterns of specialization" (Allen, 2006b, p. 45).

VoC assumes that due to differentiation of the institutional setting while CMEs have comparative advantages in "medium-high tech industries," LMEs have comparative advantages in "high-tech industries" (Schneider et al., 2010, p. 249). In this approach "new industries" are linked to radical innovation while "old industries" are linked to incremental innovation (Crouch, 2005, p. 444). According to Hall and

Soskice (2001, pp. 39-40), radical innovation is important for fast-moving technology sectors which require “innovative design” and “rapid product development” based on research (e.g. biotechnology, semiconductors, and software development). Additionally, they emphasize that radical innovation is important in the provision of “complex system-based products” such as telecommunications or defense systems, or service sectors – e.g. airlines, advertising, corporate finance, etc. Besides, Hall and Soskice point out that incremental innovation is important for maintaining competitiveness in the production of capital goods, such as “machine tools and factory equipment,” “consumer durables,” and “engines and specialized transport equipment.” In that sense, incremental innovation aims to devise incremental improvements to increase the quality of an established line to decrease costs and increase customer loyalty (ibid).

In VoC, CMEs are identified with incremental innovation since the workforce in these economies is sufficiently skilled with relatively high autonomy to come up with such innovations. They have firm-specific skills. However, LMEs are based on radical innovation since skilled workers have a high level of mobility across companies (Allen, 2006b, p. 50). In CMEs close inter-firm collaboration makes it possible for clients and suppliers to suggest incremental improvements in products and production processes (Hall & Soskice, 2001, p. 39). The market is coordinated through non-market mechanisms. There is a high level of vocational training. “Long-term industrial finance” is provided. Companies collaborate on technology-related activities and wage-setting. Hence, this institutional setting supports incremental innovation (Jackson & Deeg, 2008, p. 546). By contrast, in the VoC literature, it is assumed that LMEs limit firms’ capacities for incremental innovation. Under the

circumstances that financial market arrangements concentrated on profitability and corporate structures based on unilateral control, incremental innovation does not exist (Hall & Soskice, 2001, p. 40). LMEs are characterized by “generic assets” while CMEs are characterized by “specific assets” (Boschma & Capone, 2015).

Akkermans, Castaldi, and Los (2009) point out that one of the fundamental hypotheses of VoC which is LMEs produce radical innovation and CMEs produce incremental innovation is methodologically flawed. By means of relying on Taylor’s (2004) academic work, they question whether the hypothesis that LMEs specialize in radical innovation while CMEs specialize in incremental innovation is true or not. After making comparisons between the German and American cases by considering the range of technologies affected by the patented innovation, they conclude that the VoC hypothesis should be rejected “as a law that would apply to all industries and all dimensions of radicality” (ibid, p. 190). Hence, according to the study, innovation diversity is heterogeneous across industries in the United States and Germany. For instance, while LMEs are specialized in chemicals and electronics, CMEs are mostly specialized in the machinery and transport equipment industries. Akkermans, Castaldi, and Los (2009) emphasize that the innovation testing procedure may be based on more disaggregate level, industries instead of aggregate economies.

To conclude, VoC institutions embedded in market economies are regarded as significant when it comes to the innovation styles of markets to be determined. It is assumed that different institutional settings create different innovation outcomes for markets. While CMEs have a comparative advantage for incremental innovation, LMEs have a comparative advantage for radical innovation. Though VoC

particularly identifies innovation styles for the ideal-typical market economies, LMEs, and CMEs, it does not identify innovation styles for the outlier market categories, which are regarded as relatively low performers.

3.2.6.2 MME as a Disadvantageous Market Economy to Produce Innovation

In VoC two ideal typical market economies, LMEs and CMEs are identified. These ideal-typical market economies are portrayed with strong institutional complementarities and high-level coordination. Hall and Soskice (2001, p. 21) argue that “two types of economies have quite different capacities for innovation.” Besides they see innovation as “one of the most crucial dimensions of economic success” (ibid, p. 44). Hence, it is assumed that “advanced capitalist countries whose institutions best fit either the LME or CME types perform better than countries whose institutions are mixed” (Campbell & Pedersen, 2007). In the VoC literature, MMEs are assumed less likely to yield functionally beneficial institutional complementarities (ibid). Hence, MMEs are regarded as disadvantageous not only in terms of economic success but also in innovation performance.

Malik (2017, p. 324) points out that in VoC LMEs and CMEs are regarded advantageous due to “national institutional coherence.” MMEs are regarded as “performing poorly in both radical and incremental innovation” due to a “lack of national institutional coherence” and “institutional incoherence is the primary source of MMEs’ comparative disadvantage” (ibid). According to Akkermans et al., (2009) MMEs are at a disadvantage in the transformation of patents into exported products.

Hall & Gingerich (2009) point out that MME underperforms on any measure of innovation performance in the radical innovation sectors.

In their study, Campbell & Pedersen (2007) challenged the main assumptions of the VoC literature and examined the Denmark case – as a hybrid economy – in terms of its “unexpected” success in creating innovation in various areas such as wind turbines or pharmaceuticals. In that sense, by means of providing an exceptional case, Pederson challenged the mainstream approach of the VoC literature.

Even though VoC identifies market-specific innovation patterns for CMEs and LMEs, it does not identify a specific innovation pattern for MMEs. In the VoC literature MMEs are regarded disadvantageous in terms of economic performance and production of innovation. Due to a lack of strong institutional complementarities, MMEs are expected not to perform well compared to ideal-typical market economies.

3.2.7 Conclusion for VoC Approach

VoC puts the firm at the center of institutional cobwebs. In this understanding, firms are regarded as profit-oriented entities which turn dynamic capabilities into high economic performance which includes high innovation performance. The approach highlights the position of firms in a market economy relative to the business ecosystem that they are encircled. Hence, at a point, the firm is regarded as endogenous and dependent on the institutional dynamics, and its

performance is based on its coordination abilities through institutions with other market actors. In the market economies (ideally depicted as LMEs and CMEs), it is assumed that the firms face coordination problems when they are interacting with internal and external actors. The VoC approach attributes specific value to the institutional complementarities for firms to overcome this coordination problem. Only market economies that enjoy environments of strong institutional complementarities are regarded as well-performing with high innovation capabilities. Therefore, as ideal-typical models, when it comes to innovation performance, LMEs, and CMEs are regarded more advantageous compared to MMEs since they lack strong institutional complementarities which ensure strong coordination in the market ecosystem. By implication, the VoC literature concludes that the MMEs have weaker institutional complementarities compared to LMEs and CMEs. Hence, in this context at the macro-level, the literature does not expect a high level of innovation to be produced in MMEs.

In the context of overcoming the coordination problem, VoC literature identifies five areas that firms should establish competencies. These five areas are “corporate governance,” “internal structure of the firm,” “industrial relations,” “education and training system” and “inter-firm relations” (Hall & Soskice, 2001). However this literature does not specify the meso-level institutions that tell us “who can play and how they play” (Steinmo, 2015) in producing high innovation performance. In producing high innovation performance, the literature is not clear as to which institutions play key roles, their coordinating functions, and how and at what level they do so. I have to make three points here.

The first point is that the literature is not clear on identifying what the key institutions are to produce innovation in a market economy. In general, in the VoC literature, the institutional complementarities and their coordinating function are regarded as a prerequisite for a high-performing market economy that is expected to yield innovative outcomes. The literature emphasizes that corporate governance regimes are key institutions that determine the innovation patterns of a market economy. However, the VoC literature does not specifically describe the institutions which would make innovation possible in a market economy.

Second, this literature does not specify which coordinating functions institutions play in producing high innovation performance. In the VoC approach, the institutional complementarities are given as a holistic remedy which increases the overall performance of markets. Hence in the literature, the particular coordinating functions institutions ideally play are not adequately developed.

Finally, the literature categorically assumes that innovation is coordinated at the national level, therefore, a market economy that is not akin to LMEs or CMEs will not perform high in innovation outcomes. In this way, the literature does not explore coordination beyond the national level, and hence, is blind to coordination at the sub-national level.

The VoC literature does not look for the dynamics that may potentially make innovation possible in MMEs and concludes that these market economies are underperformers when it comes to innovation outcomes. To understand what makes innovation possible in MMEs, I explore the Systems of Innovation (SI) literature and its spin-off literatures which are National Systems of Innovation (NIS) and Regional

Innovation Systems (RIS) literatures to address the factors which make innovation possible in MMEs at different levels.

3.3 Systems of Innovation (SI)

3.3.1 Introduction to SI Approach

VoC sees MMEs as low-performers when it comes to producing innovation. And the VoC literature does not adequately address my research questions which are “How can innovation be possible in Mixed Market Economies (MMEs)?” and “Which level of coordination brings out innovation?” Hence to answer my research questions, I will examine another literature which is Systems of Innovation (SI).

In the Systems of Innovation (SI) section, I will consult SI literature and its spin-off literatures which are National Systems of Innovation (NIS) and Sub-National Innovation Systems (SNIS) to have alternative explanations for the production of innovation outcomes in MMEs. And in this context, at the end of the section, I conclude with three points. The first point is that similar to the VoC, the SI literature also sees innovation as an outcome of systemic interactions in an ecosystem. Thus, regardless of the level of interaction, the coordination of stakeholders is regarded as a prerequisite for innovation outcomes. The second point is that the NIS regards innovation in the same direction as VoC regarding nation-level coordination. According to the NIS approach, in an ecosystem innovation outcomes would be possible if there is nation-level coordination with a macro-level strong institutional set-up. Therefore it assumes that systemic cooperation at the

national level leads to innovation outcomes. The third point is that sub-national innovation literature provides an alternative explanation to the NIS approach. In this literature, it is emphasized that regardless of nation-level coordination, thanks to sub-national coordination, systemic interaction, and institutional complementarities, innovation outcomes can be possible. Hence, in a market economy that may be classified as a low innovation performer at the national level, high innovation performance is still possible at sub-national levels. Though a country would have a relatively low innovation performance at the overall level, at a sub-national level high innovation performance would still be achieved. Sub-national innovation performance in a market economy may create an uneven picture in contrast to the macro outlook.

In this section, I will be reviewing SI literature to answer the research questions of “How can innovation be possible in MMEs?” and “Which level of coordination brings out innovation?” First of all, in 3.3.2 I will briefly cover the overall SI approach. SI sees innovation in the same direction as VoC. In both approaches, innovation is regarded as the outcome of various stakeholders’ interactions. And innovation is not considered an outcome of a linear process but an interactive one. In 3.3.2.1 I will cover the National Systems of Innovation (NIS) approach. Similar to VoC, this approach regards national-level coordination and macro-level institutional complementarities as a prerequisite for innovation outcomes to be possible in a market economy. In 3.3.2.2, I will address the Sub-National Innovation Systems (SNIS) approach. This approach provides an alternative explanation to the innovation outcome. Even though there may be a lack of strong institutional complementarities and macro-level coordination in a market economy,

thanks to local factors and sub-national level coordination, innovation outcomes can still be possible. In this section, I will discuss the details of the SNIS approach. And finally in 3.3.2.3. I will cover the leading successful SNIS cases in France, Greece, Italy, Portugal, Spain, and Turkey.

3.3.2 Systems of Innovation

The SI literature has similarities with the VoC when it comes to studying the role of firms in an ecosystem to produce innovation. The SI studies the “systemic interactions between the various components of inventions, research, technical change, learning, and innovation” (Soete et al., 2009, p. 7). And this approach addresses the interaction between “a set of actors such as firms, other organizations, institutions that interact in the generation, diffusion....and production process” (Fischer, 2001). In the literature, innovation system is conceptualized at various levels, such as “national,” “sectoral,” “regional” and “corporate innovation systems” (Granstrand & Holgersson, 2020, p. 2). Though there is no consensus over the definition of the system of innovation concept, Tijssen’s (1998) network conceptualization may be utilized for defining it:

An evolving mutual dependency system based on resource relationships in which their systemic character is the outcome of interactions, processes, procedures, and institutionalization. Activities within such a network involve the creation, combination, exchange, transformation, absorption, and exploitation of resources within a wide range of formal and informal relationships. These network resources comprise various kinds of capabilities, competencies, and assets, which can be divided into ‘tangibles’ e.g., codified knowledge, substances, and technical facilities such as software and equipment, and ‘intangible’ resources skills, know-how, experience, and personal contacts. (Tijssen, 1998: 792)

Similar to the VoC, in SI “innovation at the aggregate level” is considered to be the outcome of an “interactive process that involves many actors at the micro level” (Soete et al., 2009, p. 7). Hence, the performance at the macro-level is considered dependent on the performance of micro entities. In that context, as VoC does, the SI approach puts the firms in the center as endogenous entities and their outcome performance is correlated with the ecosystem and its institutional setting on the supporting role.

As it is in the VoC approach, in the SI approach, innovation outcome is regarded as an outcome of the interactive process. SI points out the “interdependence and non-linearity” (Edquist, 2006). In this approach, it is emphasized that “firms do not normally innovate in isolation, but in collaboration and interdependence with other organizations” (ibid). Thus, in SI it is assumed that innovation is not only identified by “the elements of the system” but also “the relations between these” (Edquist, 1997, p. 23). Innovation is not regarded as a linear process but more of an interactive process. The interactive innovation model presented an alternative understanding to the explanations for the production of innovation. Before this model was generated, innovation was assumed to be a linear process. However, the emerging innovation approach identifies the innovation process as an iterative process with “downstream and upstream phases.” This process is led by feedback and interaction. Thus, with the involvement of various stakeholders, innovation outcome is produced in a non-linear way (Fischer, 2001, pp. 201-202). The innovation process includes interaction within the firms. Within the product development phase, internal stakeholders of a firm interact with each other. And in the second phase of interaction, firms interact with external stakeholders such as

“customers,” “suppliers,” “research institutions” or “competitors” (Fischer, 2001, p. 202). In addition to the emphasis on interaction, in SI, learning activity is also put in the center. Not only learning through formal education or R&D activities but also learning by doing or learning through everyday experiences (from engineering to marketing) are regarded as a significant part of the innovation process (Edquist, 1997, p. 18). Thus, “the knowledge-based economy” or “the learning economy” is related to the production of innovation (ibid).

SI emphasizes the significance of institutions. Although there is no consensus over the definition of institutions in the SI context, SI finds “the role of institutions” significant (Edquist, 2004). Institutional inputs are regarded as vital to produce innovation. And SI has a holistic perspective. It addresses the innovation outcome from a wider perspective by including “organizational,” “social,” “political” and “economic” factors (Edquist, 2006, p. 4). Actors’ innovation-related activities are designed by the institutions (ibid). However, institutions are not only regarded as the organizations that shape firm activities, but they are “sets of common habits, routines, established practices, rules, or laws that regulate the relations and interactions between individuals, groups, and organizations” (Edquist, 2006, p. 5). In SI firms are regarded as endogenous entities that “behave and perform very differently concerning innovation activities in different contexts” due to “different structural environments” (Edquist, 1997, p. 19). Besides, markets are regarded as significant mechanisms which have an impact on the innovation performance of firms. Not only the market itself but also “non-market-based collaboration” in an ecosystem is regarded as vital for the production of innovation (Edquist, 2006, p. 6). SI regards the production of innovation in the context of a coordination problem as

well (Soete et al., 2009., p. 8) and innovation is regarded to be produced with the interaction of “individual actors” and “institutions that govern their interaction” which result in a coordination problem (ibid).

In a system of innovation, while institutions and organizations have a central role to shape the innovation performance of firms, some innovation-related activities are expected to be observed. In a system of innovation, research, and development activities are conducted, hence knowledge is created and diffused. As a result of that new products and services are launched. As a support service, education and training-related activities are provided. Hence, competence is built on “human capital.” Thanks to the dynamic environment, to increase innovation performance new practices are adopted and organizations are changed accordingly. Stakeholders interact with each other through various channels and networks. For firms to innovate more, they are provided infrastructure, financial resources, “facilities” and “administrative support.” Furthermore, “consultancy services,” “technology transfer,” “commercial information” and “legal advice” are expected to be provided as well (Edquist, 2004, p. 488).

Within the framework of SI, there are sub-literatures such as National Systems of Innovation (NIS) and Sub-National Innovation Systems (SNIS). In this literature, coordination at different levels which ends up with innovative outcomes is addressed differently. In the upcoming sub-sections, I go into the details of these sub-literatures.

3.3.2.1 National Systems of Innovation (NIS)

The National Systems of Innovation (NIS) approach emerged in the 1980s and 1990s with the early studies of Freeman (1987), Lundvall (1992), and Nelson (1993) (Godin, 2009). This approach addresses the “number of product or process innovations that have been brought about in a certain country within a certain period” (Balzat, 2002, p. 9). Galli & Teubal (2005, p. 345) define the NIS as “the set of organizations, institutions, and linkages for the generation, diffusion, and application of scientific and technological knowledge operating in a specific country.” Nelson defines NIS as “a set of institutions whose interactions determine the innovative performance of national firms” while Lundvall defines NIS as “it is constituted by elements and relationships which interact in the production, diffusion, and use of new, and economically useful, knowledge” (Godin, 2009; Lundvall, 1992; Nelson, 1993).

In the NIS, the innovation system at the macro-level is regarded as the aggregation of “microeconomic foundations.” Thus, countries are assumed to have distinct “institutional settings,” “formal and informal, firm and industry-specific characteristics,” “scientific research,” “technological opportunities,” “different cultures, norms, and values and attitudes toward innovation policies” (Acs et al., 2017, p. 999). Thanks to this differentiation across different countries, countries are assumed to have different innovational patterns at the national level. Within the framework of NIS, countries are assumed to have different economic performances due to the “systematic differences” they have. Besides, economic performance is not only related to “technological and innovation capabilities” but also institutional

settings of countries. And finally, innovation policies are regarded as significant inputs to increase the overall performance of countries (ibid).

In the NIS approach, the nation is assumed to be consisted of “interconnected companies,” “associated institutions,” “agents,” “rules and norms” and “a political government setting the formal rules” (Acs et al., 2017, p. 1002). Hence, in the context of innovation nation is set as the unit of analysis. It is not only addressed spatially, but in terms of innovation output, it studies all the patterns, institutional settings, and interactions within this area. In the SI approach, the central idea is that innovation can be produced through the interaction and cooperation of various actors such as “the science sector,” “the business sector” and “firms” (Balzat, 2002, p.10).

As a sub-field of the SI, in the NIS approach, it is assumed that the innovative activity is shaped by the institutional set-up of a country. And the NIS is assumed to be consisted of “organizations and institutions that influence each other in developing, absorbing, and diffusing innovations in a country” (Balzat, 2002, p. 11). NIS studies the impact of institutions and organizations on national innovative activity regarding the process influenced by various actors and institutional frameworks (ibid). The approach studies the innovation outcome in the context of organizations of a country such as “political bodies,” “national councils,” “bureaucratic bodies,” “regulatory bodies,” “social bodies,” “educational bodies,” “knowledge-oriented bodies” and “profit-oriented firms.” Thereby the innovation pattern of a country is assumed to be shaped by national characteristics such as “size,” “social and economic developments” and “sectoral specialization” (Galli &

Teubal, 2005, p. 346). Hence, the NIS approach emphasizes the significance of “systemic cooperation” (Samara et al., 2012) at the national level.

The NIS approach replaced linear thinking with the more holistic system approach and focused on the “interdependencies” among various actors in the national context (Groenewegen & van Steen, 2006, p. 268). Organizations of a market economy are assumed to be embedded in an institutional setting. Hence, institutions in a market economy are assumed to be functioning in a supporting role for organizations to produce innovation (Kaiser & Prange, 2004, p. 398). According to the NIS approach, the innovation performance of a firm embedded in a market economy is shaped by the institutional setting. From economic structure to the labor market and industrial setting, many institutional complementarities are assumed to have an impact on the innovation performance of firms. Thus, NIS features may be considered as a “structure” since they rely on the “path-dependent” practices in a market economy (Filippetti & Archibugi, 2011, p. 180).

In the literature, various scholars present various elements, parameters, or variables for the NIS. According to Lundvall (2010, p. 6), the performance of a NIS is based on the “efficiency and effectiveness in producing, diffusing and exploiting economically useful knowledge” which can be measured through indicators such as “R&D expenditure as a proportion of GDP.” In the national context, “internal organization of firms,” “inter-firm relationships,” “the role of the public sector,” “the institutional set-up of the financial sector” and “R&D intensity and R&D organization” are regarded as the elements of the system which make national economies differed from the each other. Hence, according to the NIS for a firm to be

producing innovation, certain circumstances should be provided. Different elements and conditions play a significant role at a national level to produce innovation. For instance, the learning capacities of firms, the competition and cooperation dynamics in the market, the role of the public sector in producing innovation (regulations and standards), the financial system, the R&D system (its resources, competencies), and national education and training system are regarded as significant components of the NIS (ibid). Nasierowski & Arcelus (2003, p. 218) identify variables such as “gross domestic expenditure on research,” “degree of private business involvement in R&D,” “employment in R&D,” “total educational expenditures,” “patents by a country’s residents” as NIS components and relate them with the efficiency of NIS. In Bartels, Voss, Lederer, and Bachtrog’s model (2012, p. 11) factors such as “structural dynamics of knowledge management” (e.g. techno managerial and innovation competence), “structural dynamics of decision making” (e.g. political incoherence), “structural dynamics of government-business relation” (e.g. export orientation) and “structural dynamics of the market” (e.g. exchange rate fluctuation) are formulated as the determinants of the NIS.

Samara et al. (2012, p. 627) point out that “governments,” “enterprises,” “research and technological organizations” and “educational institutions” are various actors that take action in the NIS. NIS can be decomposed into several substructures which are “knowledge and human resources,” “research activities,” “market conditions,” “institutional conditions,” “financial system” and “technological performance” (ibid). Each and every substructure is regarded as a significant area that has an impact on the innovation performance of the country. According to Filippetti & Archibugi (2011, p. 180), in the NIS approach it is emphasized that in

the context of producing innovation, firms in a market economy interact with other market actors such as “universities,” “research centers,” “users and suppliers.” Thus, innovation activity is performed in a “national institutional context” (ibid).

The NIS and VoC approaches have similar understanding when it comes to explaining the innovation performance of market economies. In both approaches, innovation is regarded as an outcome of an interactive process in that many actors are involved. Innovation outcome is not solely addressed as an outcome of individual firms. However, firms, their surroundings, other market actors, and institutional complementarities are simultaneously regarded as significant to produce outcomes. From the financial structure of the market to education and vocational structures, the institutional context of a market is regarded as significant holistically. The firm located in a market is considered endogenous to the market structure. And innovation outcome is not solely related to firms’ competencies but the ecosystem. Thus, innovation is considered the outcome of a holistic market activity. Innovation performance of firms is addressed at a wider level including the institutional complementarities and coordination at the national level is regarded as a prerequisite for innovation to be produced in a country. In NIS, firms’ innovation performance is related to the market economy that they are located.

3.3.2.2 Sub-National Innovation Systems (SNIS)

VoC and NIS literatures have a similar approach to the innovation outcome. In these two literatures, innovation is regarded as an outcome of stakeholders’ interaction. Furthermore, it is not perceived as the outcome of a linear process but an

interactive one. In addition to that in this literature innovation outcome in a market is regarded as possible under the circumstances that there are strong institutional complementarities and high-level coordination. Hence, it is assumed that the high innovation performance of a firm would be possible if the firm is operating in a market economy with strong institutional complementarities and high-level coordination. In VoC, MMEs are regarded as disadvantageous due to a lack of strong institutional complementarities. The way how innovation outcome is addressed in the NIS approach is in the same direction as the VoC approach. Thus, innovation outcome is not related to the performance of a firm itself, but to the surrounding and the ecosystem.

Contrary to the assumptions of VoC and NIS, the sub-literatures of SI, which are Regional Innovation systems (RIS) and Local Innovation Systems (LIS), that may be categorized under the umbrella of Sub-National Innovation Systems (SNIS), provide an alternative approach. In the SNIS, innovation outcome is regarded as possible at the sub-national level. And, nation-level coordination and strong institutional complementarities are not considered as a prerequisite for innovation to be possible. Conversely, local-specific or regional factors and complementarities are regarded as key to innovation success. Hence, despite a market economy being disadvantageous regarding innovation success, at the sub-national level innovation outcomes can still be possible.

In a country, there may be unevenness and disparities regarding the innovation outcome. Therefore, in different regions of a country, there may be different innovation patterns. Cooke (2008) points out that:

Countries are normally too large, complex, and metropolitan-focused in that they generally favor asymmetric economic development in their capital cities and are ill-equipped to deal with the knowledge complexity of assisting regional knowledge capabilities. (Cooke, 2008: 402)

Hence due to the complexity dimension, the nation-level analysis may be misleading to understand the knowledge diffusion or innovation performance of a country at different levels. By referring to Nelson's study (1993), Cooke et al. (1997) point out that due to "complexity and diversity," it is difficult to "generalize and even abstract from the effects of national political economies in seeking to specify a model of a generic innovation system at the national level."

According to Porter, "the enduring competitive advantages in a global economy lie increasingly in local things knowledge, relationships, motivations that distant rivals cannot match"(Asheim & Isaksen, 2002, p. 77; Porter, 1998). Hence thanks to "close inter-firm communication, socio-cultural structures, and institutional environment" embedded in clusters and districts, these areas are regarded as the centers of 'collective learning and innovation' (Muscio, 2006) The proximity of regional actors makes knowledge be created and utilized faster within these areas and the regional capabilities are mostly related with "inter-firm networking," "inter-personal connections," "local learning processes" and "sticky knowledge embedded in social interaction" (Maskell, 2001; Maskell et al., 1998; Muscio, 2006, p. 775).

According to Cooke (2002):

At the regional level, particularly where there is a regional governance structure, presence of knowledge centers, finance, and industry clusters, policies are being developed to support clusters by creating 'economic communities' within a multi-level governance structure to develop access to global markets. (Cooke, 2002: 133)

The Regional Innovation Systems (RIS) concept drew remarkable attention from scholars and policymakers in onwards 1990s (Doloreux & Parto, 2005, p. 134). In the RIS, “the economic coordination at the meso-level” is correlated with the innovation outcome (Asheim & Isaksen, 2002, p. 82; Muscio, 2006, p. 774) and this outcome is related to the “regional networks of innovators, local clusters and the cross-fertilizing effects of research institutions” (Asheim & Isaksen, 2002, pp. 82-83). The RIS is regarded as a “complex system with strong interactions between several actors systematically engaged in learning activities (Muscio, 2006, p. 774). Hence, in this system, “the firms,” “research institutions,” “training centers” and “industry associations” engage and interact with the each other (ibid). Furthermore, the sub-national systems are not limited to RIS, but several clusters and districts may be considered as “local innovation systems” which have “independent learning and innovation patterns” (Muscio, 2006, p. 776).

RIS examines the role of “place-specific” and often “non-economic factors” in creating a competitive advantage in a region. The main crux of regionalization is that “specific local” and “regional resources” may be significant on firms’ level of competitiveness (Asheim & Isaksen, 2002, p. 77). In this approach, it is assumed that regional factors are determining firms’ innovation capabilities. The regional innovation system (RIS) may be defined as “the institutional infrastructure supporting innovation within the production structure of a region” (Asheim & Coenen, 2005, p. 1177). The regional production structure may display clustering tendencies. Supportive infrastructure in regions and knowledge generation subsystems consisting of public and private research laboratories, universities, colleges, technology transfer agencies, vocational training organizations, etc. create a

complex and dynamic interaction that ends up in systems of innovation (ibid). The concept of RIS may be understood as “a set of interacting private and public interests, formal institutions, and other organizations that function according to organizational and institutional arrangements and relationships conducive to the generation, use, and dissemination of knowledge” (Doloreux & Parto, 2005, p. 134).

According to Cooke (2002):

Where there is a rich innovation infrastructure, ranging from specialist research institutes to universities, colleges, and technology transfer agencies, and institutional learning is routine, firms have considerable opportunities to access or test knowledge, whether internally or externally generated to the region. (Cooke, 2002: 136)

Within the framework of the Regional Innovation Systems concept, it is widely discussed that the regional competitive advantage is based on “firm-specific competencies,” “learning process” and “localized capabilities such as specialized resources, skills, institutions and share of common social and cultural values” (Doloreux & Parto, 2005, p. 134). According to Cooke (2002, p. 135), the concentration of producers in a region provides “specialized inputs” for local suppliers, and generates “skills pools” and “information spillovers.” In addition to that, the existence of regional governance mechanisms, infrastructure, and specifically “communication links” support the innovation outcome of a region. According to (Cooke et al., 1997, p. 476), there are three significant institutional forms for RIS capacity which are “financial, learning and productive cultures.” Hence the availability of “decentralized spending” which basically refers to a certain level of “administrative decentralization” (Cooke et al., 1997, p. 482) is significant for certain regions, though some of them may not have administrative decentralization in financial issues. In addition to their autonomous capability on

making expenditures, the role of regional financial intermediaries, the existence of “regional information and promotion policies,” “control of strategic infrastructures” and “density and quality of infrastructures for innovation” (Cooke et al., 1997, p. 482) increase the capacity of regions.

The relationship between the regional clusters and innovation patterns can be examined through the RIS literature. In the RIS literature, territorial agglomeration and regional specialization are regarded as significant drivers of the generation of innovation. Firms clustered around various industries in a region may create “regionally embedded knowledge.” This “sticky knowledge” which includes “collective tacit as well as disembodied codified knowledge” may determine the regional competitive advantage (Asheim & Coenen, 2005, p. 1) The creation of a “knowledge-based economy” through various clusters specialized in certain areas is correlated with the creation of innovation. However, it is also pointed out that a knowledge-based economy does not have to produce radical innovation. A learning economy which is consisted of small-sized industries such as Denmark may be good at catching up with learning but it would end up in incremental, “non-R&D based product innovations” (Asheim & Coenen, 2005, p. 1175). Hence, the regional clustering of firms may be differentiated in terms of diffusion of knowledge and creation of knowledge. In the regions where knowledge is created radical innovation is observed, while in the regions such as Nordic clusters where knowledge is diffused efficiently, incremental innovation is observed (Asheim & Coenen, 2005, p. 1176). Agglomerations of firms in different regions generate localized skill pools and create a ground for information spillovers. In the RIS literature, it is assumed that in an ecosystem institutional learning is routine, firms have access to knowledge, and “the

triple-helix of interaction between industry, government and universities” is promoted, the interactive innovation processes can be created (ibid).

3.3.2.3 Leading SNIS Cases in MMEs

In ideal-typical market economies, there are successful SNIS cases. In LMEs, there are successful SNIS cases such as Silicon Valley in the United States and the biotechnology cluster in Cambridge, United Kingdom, and CMEs there are also successful SNIS cases such as Baden Württemberg in Germany and Horten in Norway. Despite that MMEs are regarded as disadvantageous to produce innovation, at the sub-national level there are also innovation systems in MMEs with high or emerging innovation performance: Emilia-Romagna region in Italy, Kriti (Crete) Region in Greece, Norte Region in Portugal, the Basque region in Spain, Sophia-Antipolis Technopolis in France and METU Technopolis in Turkey.

3.3.2.3.1 Emilia-Romagna Region in Italy (RIS)

According to Trigilia and Burroni Italy as an MME is not determined by the ‘peculiar set of national institutions’ but is mostly characterized by ‘local and informal institutions’. Thus, they define the Italian case as a networked economy based on relational capacities and name it ‘regionalized capitalism’ (Trigilia & Burroni, 2009, p. 633). Emilia-Romagna Region in Italy is a significant example of regionalized capitalism in Italy.

In 1982, Brusco (1982) drew attention to the Emilian model which was applied in Third Italy, and emphasized that in terms of economic performance, this region performed much better compared to the other parts of Italy. The success of the Emilian model can be explained by the regional and local dynamics.

First of all, the region has strong regional institutional complementarities. Small and medium-sized local firms are incentivized and supported by local administrations (Mosconi & D'ingiollo, 2021, p. 12). The region has universities and research centers. There is close cooperation between regional universities and the 'business community'. For instance, the Motor Vehicle University of Emilia-Romagna which is strongly cooperating with the leading manufacturers of the automotive industry can be given as an example of this cooperation (Mosconi & D'ingiollo, 2021, p. 6). In 2002, a regional law called 'Regional System for Industrial Research, Technology Transfer and Innovation' was passed which had the goal of reinforcing the link between 'local production systems', and 'research institutions' through new ways of technology transfer, particularly in the high tech sectors. Thanks to this law, a special fund was provided for the stakeholders in the region, and from industrial and service firms to universities, innovation centers, and technology transfer offices, various stakeholders were supported by the regional administration (Rinaldi, 2007, p. 261).

Second, due to agglomeration and clustering, the region has a strong manufacturing base. Leading manufacturing companies are co-located in certain districts (Mosconi & D'ingiollo, 2021, p. 7). Thanks to agglomeration, the region has place-specific know-how on 'mechanical products', and 'computer, optical and

electronic devices' (Mosconi & D'ingiuolo, 2021, p. 10). Mosconi and D'ingiuolo provide specific examples of the sector-specific agglomeration in the region such as 'automotive of Bologna and Modena', 'mechatronics of Reggio Emilia', 'biotechnology of Mirandola', and 'pharmaceuticals of Parma' (Mosconi & D'ingiuolo, 2021, p. 7).

According to the Regional Innovation Scoreboard 2021 ranking of the European Commission (2021), though at the overall level, Italy is identified as a moderate innovator, the Emilia-Romagna region is ranked highest in Italy with an RII performance of 109.4 and identified as a strong innovator in terms of performance sub-group, followed by Provincia Autonoma Trento and Veneto regions. The region is ranked 4th in terms of 'Top-10 fastest growing regions'. In the Scoreboard it is highlighted that 'the most innovative regions are typically in the most innovative countries' (European Commission, 2021). Hence Emilia-Romagna is presented as an exception.

3.3.2.3.2 Kriti (Crete) Region in Greece (RIS)

Kriti (Crete) region in Greece is identified as a 'potential pocket of innovation' due to its performance in science and technology. Thanks to universities (e.g. University of Crete), science parks (Science and Technology Park of Crete), and research centers with high science performance and their cooperation with industries such as the telecommunication systems industry, the region is regarded as a promising region for innovation in Greece. In terms of patent applications and high-tech inventors, the region has a prominent position in Greece (Reid, Markianidou, &

Evrigenis, 2016). With the implementation of the Smart Specialisation Strategy, the region aims to enhance competence in innovation and scientific knowledge in several areas such as nanotechnology, biomedicine, biology, and microelectronics (Management Authority of Crete Region, 2015).

Though at the overall level, the innovation system of Greece has ‘structural asymmetries and the market economy has a relatively lower innovation capacity (Komninos and Tsamis 2008), the sub-national innovation performance of the country has been gradually increasing. In the Regional Innovation Scoreboard 2021 Ranking of the European Commission (2021), Greece is identified as a ‘moderate innovator’. Attiki region with an RII score of 86,9 and the Kriti region with an RII score of 82,1 are the leading regions though they are moderate innovators as well. Voreio Aigaio, Notio Aigaio, Anatoliki Makedonia – Thraki, Dytiki Makedonia, Ionia Nisia, Sterea Ellada, and Peloponnisos regions are identified as ‘emerging innovators’ in Greece. With these seven emerging innovator regions, Greece is among the high performers in terms of emerging innovators. Ipeiros, Ionia Nisia, Thessalia, and Kentriki Makedonia ranked as the Top 10 fastest-growing regions in Europe. Besides, innovation performance compared to the EU has increased for all regions in Greece except one region. Furthermore, in terms of ‘R&D expenditure in the public sector as a percentage of GDP’, Kriti, Ipeiros, and Dytiki regions are regarded as high performers. And in terms of ‘innovation expenditures per person employed’, several regions in Greece are regarded as high performers in Europe (European Commission, 2021).

3.3.2.3.3 Norte (North) Region in Portugal (RIS)

The northern region of Portugal drastically improved its innovation performance in recent years. During the years 2014-2020, North Portugal Regional Operational Programme was carried out to provide support for development in the region. Within the program financial support and assistance were provided to regional actors (CCDRN, 2020).

40% of start-ups in Portugal are based in Porto which is located in the region. Porto has 20 incubators and 65 R&D centers. Besides, one in three R&D units is located in the region (EY, 2019). It has big technology hubs, such as Porto Tech Hub, which provides a ground for firms and partner institutions to collaborate and innovate (Porto Tech Hub, 2022). Besides, initiatives such as ScaleUp Porto, developed by the Municipality of Porto, and the entrepreneurship ecosystem are supported by the local authorities (Scale Up Porto, 2022).

The Norte region has an emerging ICT-based innovation ecosystem. The region has an emerging position in electronics and software areas (Moreira, Selada, & Carneiro, 2008). In the Regional Innovation Scoreboard 2021 Ranking of the European Commission (2021), Portugal is identified as a ‘moderate innovator’. Lisboa region with an RII score of 89,7 and the Norte region with an RII score of 80,3 are the leading regions in terms of innovation performance. Portugal has 4 emerging regions which are Algarve, Alentejo, Região Autónoma dos Açores and Região Autónoma da Madeira. Besides, in this ranking Norte region has a more promising position compared to Portugal’s innovation performance in total. In terms of ‘trademark applications per billion regional GDP’ Norte ranked 28th and for

‘design applications per billion regional GDP’ it is ranked 20th among all regions in Europe.

3.3.2.3.4 Basque Region in Spain (RIS)

Basque Region is classified as a ‘true regional innovation system’ (Magro & Wilson, 2019). Thanks to the establishment of two ‘regional innovation governance structures’, SPRI and Basque Agency, structural changes regarding industrial competitiveness and innovation made in the region (Morisson & Doussineau, 2019, pp. 107–108). In the 1980s R&D infrastructure was established (Moso & Olazaran, 2002, pp. 61–75). With the establishment of SPRI by the Department of Industry of the Basque Government in 1981, industrial competitiveness-driven policies were formulated (Morisson & Doussineau, 2019). In the 1990s ‘after the creation of the technology transfer structure,’ the R&D structure is consolidated (Moso and Olazaran, 2002). Thanks to regional industrial policies applied in the region which were cluster-based, the region became a pioneer of the Porterian-cluster policy (Morgan, 2016, pp. 1544–60). In 2007, Basque Innovation Agency, Innobasque was established to promote innovation through public-private partnerships in the region. The Agency functioned as a coordinator between firms, universities, and the public institutions of the region (Morisson and Doussineau, 2019). From energy to mobility, to advanced machinery and electronics and ICTs, the region has competencies and capabilities in various industries (Morgan, 2016).

Currently, the Basque Region which is one of the regions that have a relatively higher level of industrialization in Spain has an advanced manufacturing

strategy that is crystallized in the Basque Industry 4.0 Plan (Sandulli, Gimenez-Fernandez, and Rodriguez Ferradas 2021, pp. 1622–36).

In the Regional Innovation Scoreboard 2021 ranking of the European Commission (2021), it is pointed out that in contrast to the overall trend that the regional innovation performance is varied limitedly in many countries, Spain has different regional performance groups as it is for Italy. According to the ranking, though at the overall level, Spain is identified as a moderate innovator, the País Vasco sub-region of the Basque country is ranked highest in Spain with the RII performance of 103.6 and identified as a strong innovator in terms of performance sub-group, followed by Comunidad de Madrid and Cataluña regions.

3.3.2.3.5 Sophia Antipolis Technopolis in France (LIS)

In France, the technology park of Sophia Antipolis which was established 50 years ago, can be given as a significant example to local innovation systems. Though in the beginning, there was no ‘industry tradition’, ‘academic centers’ and ‘human capital resources’ in the area (Bardon & Irena, 2012) with the initiative of Pierre Laffitte, this site near Côte d’Azur turned into a high-technology park. At the end of the 1970s, the firms initiated to be agglomerated in the science park, and with ‘the arrival of public and private education and research institutes’ the growth of the park was accelerated. With the growing volume of clusters, particularly in IT and life sciences, ‘local-knowledge-based interaction’ and involvement of multi-national companies, the technopolis became a ‘satellite platform’ that the companies had international ties beyond the local area (Ter Wal, 2013, 651–68).

Currently, this technology has an ecosystem consisting of big companies (e.g. Air France, Thales) and start-ups (2500 companies in total), associations and clusters, research centers, and institutes with 4500 researchers which makes this technopark one of the biggest in Europe. The firms located in this technopole mostly operate in health and biotechnology, intelligent vehicles and mobility, cyber security, fintech, and edtech areas (Sophia Antipolis, 2022).

In the Regional Innovation Scoreboard 2021 (European Commission, 2021), Provence-Alpes-Côte d'Azur where Sophia Antipolis Technopolis is located is identified as a 'strong innovator' with the RII score of, 104,9. At the country level, France is also identified as a strong innovator in contrast to VoC's assumptions that MMEs do not have high innovation performance.

3.3.2.3.6 METU Technopolis in Turkey (LIS)

METU Technopolis in Turkey is the first and one of the leading technopolises and sub-regional innovation systems of Turkey. The establishment project of the technopolis was initiated in 1987 to strengthen the university-industry relations and support high-tech development and in 2000 the technopolis started to operate (Varol & Sat, 2009).

The Technopolis area hosts a university, research institutions, and firms. Besides, a technology transfer office that provides support for university-industry collaboration and ICT Innovation & Technology Centre is located in the technopolis. Thanks to the agglomeration of these structures in the same location, mutual R&D

projects are conducted among firms and universities and the association of firms and knowledge institutions promotes innovation and entrepreneurship. Currently, the firms positioned in the technopolis (440 firms in total) are operating in various industries such as ‘software and IT (50%), electronics (20%), mechanics and design (15%), medical technologies (6%), energy and environment (6%)’. In addition to that, the technopolis has three clusters specialized in defense, ICT, and advanced healthcare technologies. One in three firms of the technopolis is defense industry oriented while half of the firms are ICT related. From ‘smart systems’, ‘mobile apps’, and ‘gaming’ to ‘big data and cloud’, the firms are mostly operating in innovative areas (METU Technopolis, 2022).

From 2011 to 2016, the technopolis is successively ranked 1st on the ‘technology development areas performance index’ of Turkey’s Ministry of Science, Industry, and Technology. In addition to that, the technopolis was rewarded by the Ministry as the most successful mature technopark in Turkey in 2018.

3.3.3 Conclusion for SI Approach

Since SI literature formulates the innovation outcome similarly to the VoC approach, it is possible to associate these two distinct literatures regarding the innovation outcome. However, in terms of the level of coordination and its impact on the production of innovation, the SNIS approach has a distinguished perspective. Through examining the SI literature, I conclude with three points.

The first point is that SI literature considers the innovation outcome similarly as it is formulated in the VoC. SI regards innovation as an outcome of an interactive process in which various stakeholders in the market participate. This literature addresses innovation as an outcome created with the interaction of firms with the surrounding elements which have an impact on their innovation performance. The distinguishing approach of the SI literature is that it regards the innovation not as an isolated outcome, but more of an outcome of the interactive process involving many actors in an ecosystem. It does not consider the outcome as the product of a linear process, but more of an interactive process. In addition to that, due to the role of external actors, innovation is assumed to be produced with the involvement of both firms and institutions coordinately. In this context, the VoC and SI have similar understandings when it comes to analyzing the innovation outcome in an ecosystem. In the spin-off SI literatures, the way how the innovation is produced in an ecosystem is addressed distinctively.

The second point is that within the scope of NIS, which is a sub-literature of SI, nation-level coordination and macro-level strong institutional complementarities are regarded vital for innovation to be produced. In the NIS literature, the innovation outcome is identified with the institutional set-up of a country and organizational layout at the national level. Hence systemic cooperation and structural dynamics at the macro-level are assumed to play a pivotal role in firms producing innovation. The NIS correlates the innovation outcome of firms with the surrounding elements of an ecosystem though these elements are mostly related to macro elements and nation-level coordination.

The third point is that SNIS literature provides an alternative approach to the NIS approach and in this literature, it is emphasized that in a market economy, the innovation outcome can still be possible despite a lack of strong institutional complementarities and market-level coordination. Furthermore, the coordination at the sub-national level, regional or local, and institutional layout embedded in the regional and local structures is regarded as a key element when it comes to producing innovation. Thus, thanks to place specific local factors, local knowledge structure, regional institutional structure, and sub-national level coordination, innovation outcomes can still be possible in a market.

3.4 Conclusion for the Theoretical Approach

In this chapter two distinct literatures that are Varieties of Capitalism (VoC) and Systems of Innovation (SI) are covered, regarding the research questions of this dissertation which are “How can innovation be possible in Mixed Market Economies (MMEs)?” and “Which level of coordination brings out innovation in MMEs?”

In the second section, VoC literature is covered. In VoC, two ideal-typical market economies, which are LMEs and CMEs are identified. MMEs – France, Greece, Italy, Portugal, Spain, and Turkey- are regarded as the third and outlier market economy category. Due to a lack of strong institutional complementarities and nation-level coordination, VoC does not expect MMEs to perform well as LMEs and CMEs. VoC assumes that firms positioned in a market economy face a coordination problem. Institutional complementarities are regarded as key to making firms in a market overcome this coordination problem and achieve high performance to yield innovative

outcomes. However, VoC does not identify what are the key institutional complementarities which would make innovation possible. Besides, this literature does not specify the coordinating functions institutions play in yielding innovative outcomes. Hence, though it is expected institutions are vital to produce innovative outcomes, the supporting role of institutions is not detailed. Finally, this literature assumes that market economies that are not akin to ideal-typical market economies, LMEs, and CMEs, do not perform well to produce innovation, due to a lack of strong nation-level coordination. Thus, this literature does not explore coordination beyond the national level. Even though through categorizing the third market economy, MMEs, VoC literature paves the way for MMEs to be studied profoundly, it does not provide a thorough framework to answer the question of “How can innovation be possible in MMEs?”

In the third section, SI literature is covered. SI literature provides an alternative approach to understanding how innovation can be possible in MMEs. In SI, similar to VoC, innovation is regarded as an outcome of an interactive process. Hence, market actors and institutional complementarities are regarded as key to innovation success as well. In the NIS approach, similar to VoC, systemic cooperation and structural dynamics at the macro-level are considered significant for innovation to be produced in a market. However, SNIS literature provides an alternative approach to NIS. Within the framework of SNIS, it is emphasized that in a market, thanks to sub-national level coordination and local factors, innovation outcomes can still be possible. In a market without strong institutional complementarities and nation-level coordination, a firm can still be innovative due to a sub-national-level ecosystem. Thus, sub-national level coordination is regarded as key to innovation success.

Synthesizing two distinct literatures, VoC and SI allows me to fill the theoretical blanks regarding innovation in MMEs. According to the SNIS approach, though an MME is regarded as disadvantageous at the macro-level concerning innovation performance, a SNIS embedded in this market can still be advantageous to produce innovation. In this context, regarding the research questions of this dissertation, findings gained from these literatures led me to conduct fieldwork in a SNIS in an MME. VoC puts the firms in the center and relates innovation performance in a market with firms' abilities to overcome the coordination problem. Therefore, innovative firms operating in a SNIS in an MME are addressed in my fieldwork. To understand "How innovation can be possible in MMEs?" and "Which level of coordination brings out innovation?" a question set is formulated to be utilized during interviews to be conducted with firms. This question set consisted of ten questions regarding the R&D-related activities of firms, their competencies to overcome the coordination problem in the market, and the impact of SNIS on their innovation performance.

CHAPTER IV

THEMES OF THE CASE STUDY IN METU TECHNOPOLIS

4.1 Introduction to the Case Study in METU Technopolis

In this chapter, I will provide the themes that emerged from the findings in the case study conducted within the scope of this dissertation. This case study was conducted to answer the primary research questions of “How can innovation be possible in an MME?” and “Under which conditions can innovation be possible in an MME?”

Within the framework of the case study, seventeen interviews were conducted with firms with different scales which are operating in different areas. This study was conducted to identify conditions under which firms located in an MME would perform innovative activities and how can innovation be possible in an MME. METU Technopolis is selected as the field since it has a leading innovation performance in Turkey. During the interviews, certain patterns were repeated, and as a result of that several themes emerged.

Both VoC and SI literatures suggest that innovation is an outcome of the stakeholders’ interaction. According to the VoC literature, owing to macro-level coordination and strong institutional complementarities, firms’ innovation performance is regarded as dependent on the institutional setting of a market economy. In this context, due to a lack of strong institutional complementarities, MMEs are regarded as disadvantageous to produce innovation. Besides, the VoC

literature addresses five areas in that firms should establish competencies to overcome the coordination problem which are “corporate governance,” “industrial relations,” “vocational training and education,” “interfirm relations” and “internal coordination” (Hall & Soskice, 2001). Hence, the market economies are differentiated regarding these coordination areas. In contrast to the suggestions of VoC literature, SI literature suggests that independent of the macro-level coordination and institutional complementarities, in a market economy, innovation outcome and high innovation performance can still be possible thanks to firm-specific, local, or regional dynamics and factors.

In this field study, an interview guideline was prepared to lead the semi-structured, in-depth qualitative interviews. The interview guideline aims to question the innovation-related factors which make innovation possible at the sub-national level in an MME. In this guideline, questions were formulated via regarding nine variables generated from the literatures which I review. Six variables generated from VoC literature are “corporate governance,” “industrial relations,” “vocational training and education,” “inter-firm relations,” “employees” and “macro-level institutional complementarities” and three variables, generated from SI literature are “place-specific factors and specific local resources,” “interdependence & non-linearity and interaction” and “generation, use, and dissemination of knowledge.”

In the field study, several leading themes were identified. While a few of these themes are related to the concepts of coordination areas and institutional complementarities in the VoC literature, the other ones are related to the SI literature. In this chapter, I will start by covering themes related to VoC literature first, and then

I will continue with the themes related to SI literature and finally, I will provide a conclusion section with a discussion on the themes from the case study.

4.2 Complementary Institutional Set-Up

In the VoC literature, institutional complementarities are regarded as the elements that provide support for firms for them to solve their coordination problem (Hall & Soskice, 2001, p. 9). In a market economy, institutions function as “facilitating the flow of deliberation and information among actors,” “permitting decentralized cooperation” and “solving familiar collective action problems” (Howell, 2003, pp. 105-106). In the VoC approach, institutional complementarities are regarded as prerequisites for high market performance. In the context of innovation, markets with strong institutional complementarities (LMEs and CMEs) are regarded as advantageous to have high innovation performance. Hence, since MMEs are assumed not to have strong institutional complementarities, they are regarded as disadvantageous to produce innovation.

In contrast to the assumptions of the literature, in the case study of METU Technopolis, most of the interviewees declared (11 out of 17 interviewees) they agree or partially agree that Turkey’s macro-level innovation ecosystem and institutional set-up have a positive impact (in various degrees) on their R&D and innovation performance. For instance, an interviewee from a small-scaled firm pointed out that:

Though there are improvement areas, I have a positive perspective. I think the relevant R&D and innovation-related mechanisms are set in Turkey. Of course,

some mechanisms require a transition period. This is all about the accumulation of experience. I think, the practitioners and young labor force have potential. Turkey has great potential.¹

Besides, a similar positive perspective is observed for a large-scale firm as well. For instance, the representative of a machinery firm mentioned that “in the recent period state support has increased for the technopolis-related areas.”²

Even though most of the participants think that Turkey’s high-level innovation ecosystem and institutional complementarities support their R&D and innovation performance, several improvement areas were addressed during the interviews as well. These improvement areas may be piled under the categories such as the concentration of innovation ecosystem in large cities, scarcity of incentives on deep tech areas, and lack of alignment and effectiveness of programs.

On the other hand, despite that most of the participants (11 out of 17 interviewees) think that Turkey’s overall institutional complementarities have a positive impact on their firms’ R&D and innovation performance, most of the representatives (14 out of 17 interviewees) pointed out that under the circumstances that their firm would not have been located in the technopolis, they would not have the similar R&D and innovation performance they currently have. They declared that thanks to the micro innovation system established in the METU Technopolis, their firms’ R&D and innovation performance is high. For instance, the representative of an ICT firm pointed out that:

Our firm would not have had a similar R&D and innovation performance if we would not be here, in METU Technopolis. This issue is partially about the ecosystem. We are comfortable with attracting new talents. If we would be

¹ Interview number 11.

² Interview number 12.

located in a different city, except one or two cities, it would be really difficult to find relevant and high-qualified R&D personnel to produce R&D.³

Access to high-qualified employees is regarded as one of the biggest advantages of the technopolis. The interviewee pointed out that in any other place, it would be difficult to attract qualified talents. Hence, for this reason, METU Technopolis is considered an advantageous location to run a business to attract high-qualified talents. On the other hand, the state's funding support and incentives make this area more attractive for businesses. For instance, another interviewee from an electronics firm mentioned that:

For us, it is critical to be located in the technopolis. If we would not here, we would have problems employing qualified people. To do R&D in certain areas, we need qualified and experienced engineers. Besides, having qualified people requires cost. The most significant part is the labor cost. Here we have significant tax advantages. If we would not in the technopolis, we would hire only one engineer rather than four. I look at the financial statements of the firm, if we would not be here, we would have downsized.⁴

Since running a business in a technopolis has financial advantages such as subsidies and tax exemptions, the firm stakeholders regard these innovation areas as optimal areas to carry out R&D activities and run their businesses. Thanks to tax exemptions, they find the opportunity to employ more high-qualified and experienced employees. Thanks to this labor input, they have higher levels of R&D performance.

In addition to technopolis-oriented factors, several participants highlighted the brand perception dimension for METU Technopolis particularly. According to seven participants, the METU brand with its prestige and reputation has a positive reflection on the brand and reputation for their businesses. Hence, they have declared

³ Interview number 3.

⁴ Interview number 6.

that for these reasons such as brand, reputation, prestige, and network factors, they prefer to run their business in METU Technopolis.

To conclude, though the VoC literature assumes that MMEs have non-strong institutional complementarities, in the case study, most of the interviewees mentioned that as an MME, Turkey's macro-level institutional complementarities have a positive impact on their firms' innovation performance. Interviewees declared that despite that there are improvement areas, institutional complementarities mostly support their business operations. Particularly the state incentives, provided for the technopolis firms are regarded as significant for firms' R&D and innovation performance. Thanks to these incentives, firms can compensate their operational costs and acquire the advantage to hire more qualified people.

4.3 Effective Inter-Firm Relations

In the VoC literature, firms are regarded as profit-oriented entities that convert their capabilities into goods and services. The firms are considered endogenous to the dynamics of the market economy. And their interaction with stakeholders in a market economy is regarded as vital for them to perform better (Hall & Soskice, 2001). The literature suggests firms in a market economy establish competency in inter-firm relations to overcome their coordination problem. The concept of "inter-firm relations" refers to;

The relationships a company forms with other enterprises and notably its suppliers and clients, to secure a stable demand for its products, appropriate supplies of inputs, and access to technology. (Hall & Soskice, 2001: 7)

Hence, thanks to this relationship, firms would be able to set the standards, and do technology transfer and research and development (R&D). And through collaboration, they would acquire competitiveness and make technological progress accordingly (Ibid). Since the market is regarded as the aggregation of individual performances of firms, the positive impact of inter-firm relationships on the company performance is also regarded as significant for the overall market performance.

In the METU Technopolis case, during the interviews, most of the firm representatives (14 out of 17 firm representatives) declared that when it comes to conducting R&D activities, they mainly prefer conducting R&D activities through cooperating with other firms and they carry out mutual R&D activities. They execute these R&D activities with firms that are located either in the technopolis or another place. As it is addressed in the literature, in the context of innovation-based interaction, firms in this ecosystem interact with the other firms through various ways such as “collaborative R&D activities,” “technology transfer and consulting,” “being sub-contractor” and “mentorship.” Independent of the business area and firm scale, firms are actively interacting with each other, they mutually do business and execute R&D-related activities.

4.3.1 Collaborative R&D Activities

4.3.1.1 Introduction to Collaborative R&D Activities

Firms in the technopolis are actively collaborating with other firms to execute R&D-related activities for several objectives. First of all, the primary objective to collaborate with other firms is the acquisition of competency through cooperation. Second, for various reasons, several firms prefer to collaborate solely with firms located in the technopolis. Hence, they limit their interaction for collaborative R&D activities with other technopolis firms. Third, several firms execute mutual R&D projects to enhance their product portfolios through developing products.

Executing a mutual R&D project enables firms to transfer competencies that they do not have, hence thanks to the mutual endeavor, they fill the operational gaps and provide better goods and services subsequently. Collaborative R&D effort creates a supply chain within the technopolis. As evident in the quotes given below, firms operating in different business areas such as defense and aerospace, machinery and electronics, do mutual R&D to fill their competency gaps. They utilize mutual R&D activities as a way of strengthening their competencies and filling the gaps in their businesses. As an interviewee noted:

We either do R&D activities on our own or carry out R&D activities by working with main contractors. When we work with the main contractors, we also find subcontractors to delegate certain work packages of the R&D project. Since many firms in the technopolis work with other firms, they have contacts in other firms as well. Hence, we somehow become aware of their projects. When we need a subcontractor, we utilize this network to reach out to the people.⁵

⁵ Interview number 1.

The innovation ecosystem enables firms to delegate certain R&D project tasks to other firms. Thus, they fill their competency gaps by outsourcing the skills and competencies they need. This sub-contracting relationship makes firms optimize their project schedules and the quality of project outcomes. In this context, an interviewee mentioned that:

We utilize this method [mutual R&D project]. We run the biggest development projects within our firm. However, under the circumstances that we are supposed to operate in another sector or we are not competent in a specific area we cooperate with other firms.⁶

During this interview, the representative gave an example that when they were working on a healthcare product that required Internet-of-Things (IoT) related competencies, they tried to cooperate with a METU technopolis firm that had a prior experience and expertise in healthcare products. Since they had no experience with healthcare products, they requested to collaborate with another Technopolis firm. Despite that, it did not turn into a final product, as the interviewee pointed out, in this process, they exchanged views, did cost analysis together, and brain-storming on a potential product which made them make progress on the R&D project. Hence this interaction and collaboration helped them to mature the R&D idea. The interviewee also added that, recently they had lost their software developers. But, thanks to close cooperation and collaboration with other technopolis firms, they compensated for the talent shortage as well.

Collaboration with other firms enables firms operating in different business areas to acquire core cross-disciplinary competencies as well. Quotes from interviews conducted with electronic firms with different scales, given below, show

⁶ Interview number 12.

that thanks to mutual R&D projects they acquire new competencies such as mechanical and software-related competencies. An interviewee stated:

When we need a solution in mechanical engineering, we try to collaborate with firms specialized in mechanical engineering. It is another discipline. We do not insist on running the project on our own and subcontracting several work packages to other firms. At the beginning of the project, we tell them what we need. We start the projects through pre-defining work packages to be assigned to other firms. They know the cost and profit. In the end, we co-own the product.⁷

Consulting with another firm that has a different core business competency is regarded as an effective method to develop a product. Bringing different competencies under a R&D project can make firms co-own a product in the end as it was mentioned in the previous quote. On the other hand, despite that a firm owns a competency, it can still decide to collaborate with another firm with this competency, as the core competency, to mitigate product-related risks. An interviewee mentioned that

We have software and mechanics teams. Electronics is our core business area. When we need more qualified software, we outsourced the software part from a third party, another R&D firm from METU Technopolis. By leaving this part to them, we conducted the R&D project.⁸

Several interviewees emphasized that due to various reasons such as proximity, similarity of way of doing work, and continuity of business, they prefer to collaborate with other firms which are located in METU Technopolis. An interviewee stated:

To find a firm to receive an R&D service for our gaps, we search for stakeholders in the technopolis ecosystem. We primarily try to solve this problem with a firm in the technopolis. This is our approach. We try to solve our problem with an internal stakeholder in our ecosystem. There are several reasons for that. One of our motivations is proximity. Since we are in the same location, we think that we can permanently work with these people since they

⁷ Interview number 17.

⁸ Interview number 6.

are close to us. We also prefer to work with these people since we have similar mindsets. Our cast of mind is similar.⁹

As is given in the previous quote, during several interviews, participants emphasized the proximity theme. Proximity was emphasized as a significant factor that has an impact on firms' decisions to choose business partners. In the interview, it was also added that "Everybody [in the technopolis] is aware of that who knows what, who can contribute to their projects... We do not only generate ideas but also produce." In conclusion, physical and cultural proximity can have a role in business partner preferences.

Firms in the technopolis do mutual R&D projects with the purpose of product development as well. During the interviews, several participants declared that they develop products with other firms that have different competencies. An interviewee mentioned that:

We develop products with other firms. We work with firms in the METU Technopolis as well. We develop products with large-scale and mid-scaled firms. At the beginning of the project, we aim to develop a product. We identify the scope and take the steps accordingly. We start with a product goal. And then we identify sub-products related to our sub-domain expertise and carry out R&D-related tasks. We interact with other firms in the context of R&D and innovation.¹⁰

Thus, through collaborating with other firms, technopolis firms execute mutual R&D projects and these projects can yield concrete results such as product ownership.

⁹ Interview number 11.

¹⁰ Interview number 16.

4.3.1.2 Limited Technology Transfer

In the VoC approach, technology transfer is mostly identified with CMEs. In CMEs, since firms are positioned in dense business networks, they tend to collaborate and cooperate. They do joint R&D, share information and do technology transfer (Hall & Soskice, 2001, p. 23).

In our interviews, except for three firms, most of the firm representatives declared that they do not do technology transfer. There are various reasons for this case such as “suitability for technology transfer,” “affordability” or “having a tailor-made manufacturing style.” Technology transfer is particularly significant for small-scaled firms that have limited financial resources and competencies. Small scaled firms’ representatives mostly declared that they do not do technology transfer from a third party. An interviewee from a small-scale firm stated that since the business area of their firm is a niche, they did not do technology transfer. Rather than doing technology transfer, they receive consultancy from the university. And thanks to know-how transfer from the university, they work on their “original” project outcome.¹¹

In another interview¹², the interviewee declared that to have cost-effective solutions, they do not do technology transfer and they carry out their R&D projects with their resources. However, he also added that though they do not do technology transfer, to follow the market trends they do benchmark studies. He emphasized that in addition to cost-effectiveness, due to specific customer requirements, they provide

¹¹ Interview number 3.

¹² Interview number 17.

tailor-made solutions. To provide customized solutions, they do not do technology transfer. In addition to that, in the interviews, it was also mentioned that even firms in the technopolis with international shareholders do not do technology transfer. To produce certain products, they need certain tools and software. Hence, to carry out R&D activities, they supply many tools from their business partners though they do not do technology transfer.

On the other hand, it was observed that technology transfer is common among small-scale ICT firms. An interviewee stated:

We do technology transfer. Despite that we mostly execute our R&D projects on our own, we still do technology transfer. We have mid-term R&D plans. In five years, our projects yield products.¹³

In two other interviews, it was also mentioned that these related firms do technology transfer, transfer and thanks to this transfer they conduct R&D projects. Furthermore, in addition to technology transfer, in one case it was also addressed that to prepare technical documentation regarding compliance with particular regulations the firm received consultancy from a third-party firm.¹⁴

4.3.1.3 Subcontractor Role for State-Owned Companies

In METU Technopolis, there are firms, operating in defense-related, electronics, or ICT areas that are functioning as sub-contractors to big state-owned companies. In the VoC literature, it is addressed that in MMEs, though the direct influence of the state has been diminished, the state still plays a significant role in the

¹³ Interview number 14.

¹⁴ Interview number 2.

economy (Schmidt, 2003). Hence, in certain business areas, particularly in the defense industry area, the state has a pivotal role. In the Turkish case, there are leading state-owned companies operating in the defense and aerospace area and they have extensive supply chains. Hence, in line with the findings in the literature, it was observed that, at the meso-level, firms operating in technopolis carry out R&D projects for these companies.

During the interviews, three firms operating in electronics, ICT, and defense and aerospace areas declared that they mostly carry out R&D projects as sub-contractors to big state-owned defense companies. The common point of these three firms is that they are all mid-sized firms. An interviewee from a defense and aerospace firm pointed out that after starting specific projects they contact the related state procurement agency and state-owned defense firms to present their work. And with the support of these institutions, they carried out many R&D works. He also added that in other projects they received orders from a state-owned defense firm. And as a response to the order, they carried out a development project.¹⁵ Hence, there is close cooperation with state-owned defense firms and technopolis firms in their supply chain. They even present their R&D projects to the related state institutions to mature them for converting them into actual products. Hence, they are supported by these big businesses.

In another interview, the representative of an ICT firm declared that their biggest client is a state-owned defense firm. Regarding these defense firms' needs and requests, they have been carrying out R&D activities. When they carry out this

¹⁵ Interview number 1.

R&D project, they try to turn project output into a product to be added to their product portfolio. He pointed out that they do R&D activities when the client triggers the process and they prefer to be a part of a R&D process if the process would yield a concrete result to be converted into a product.¹⁶ Hence, via the support they receive from the state-owned company, they conduct R&D projects, develop products and increase their competitiveness.

The representative of an electronics company emphasized that they have been carrying out long-term R&D projects with state-owned firms. In the R&D projects, these firms identify the criteria set regarding certain standards. And then they have been carrying out long-term R&D projects. During these long-term R&D projects, they conduct regular monitoring meetings with the related state institutions. In these monitoring meetings, R&D projects' completed phases are monitored, controlled, and approved by the main contractor. They complete milestones and deliver them to the related state-owned firms.¹⁷ Hence, state-owned firms are not only functioning as clients but also guiding and supporting the firms in the technopolis. In addition to that, thanks to long-term projects help these firms to survive and continue their business operations.

4.3.1.4 Mentorship

Receiving mentorship is significant for start-up firms, particularly the ones which are in the incubation phase. An interviewee of a micro-scaled firm mentioned

¹⁶ Interview number 4.

¹⁷ Interview number 6.

that thanks to the tacit mentorship they received from another firm in METU Technopolis helped them to execute their R&D activities. This case demonstrates that at the sub-national level, inter-firm relations in an MME may have resembled the inter-firm relations in a CME that is based on collaboration, information sharing, mutual R&D, diffusion of knowledge, and technology transfer. An interviewee from a small-scaled firm stated that:

We share knowledge with people. Particularly, we do share knowledge with people in the technopolis. It is more than learning technical knowledge from people. For instance, it is not like receiving consultancy from a university professor. We go to experienced people in METU Technopolis and tell them what we are currently doing. The founders of another firm located in the technopolis, operating in the same business area as us, supported us a lot. We learned how to develop a product and how to validate it from them. It happened in a friendly way, as a solidarity between people performing similar types of jobs. They supported us. We communicated with many other stakeholders as well, including the administration in the technopolis. Everybody contributed to our firm.¹⁸

Mentorship is a significant sub-theme showing the level of interaction among METU Technopolis firms. In this case, a start-up firm in the technopolis, established by a young entrepreneur, is informally supported by various stakeholders. And the founder states that thanks to this ecosystem, mentorship, and guidance of people, he has been sustaining his business. Hence, he is referring to the influence of coordination at the sub-national level over the innovation outcome. In this case, even the competitor of this firm, operating in the same business area supported another start-up company founded by a young entrepreneur. The interviewee highlights that the sustainability of his business is owing to the interaction with the METU Technopolis ecosystem and the informal mentorship they received from the technopolis actors.

¹⁸ Interview number 2.

4.3.1.5 R&D Activities in Isolation

SI literature suggests that “firms do not normally innovate in isolation” (Edquist, 2006). Both VoC and SI regard innovation as an outcome of an interactive process. In contrast to the assumptions of these two literatures, in our case, interviewees from two ICT firms emphasized that they mostly conduct R&D projects on their own and in isolation. Due to security concerns, to maintain their competitive advantage, they do not interact with other firms. An interviewee pointed out that they do R&D projects by monitoring their competitors’ moves and products. He added that

There are certain products that we consider strategic products. For these products, we identify our roadmap. We follow our competitors’ products in worldwide exhibitions.¹⁹

Hence, despite that in certain aspects the innovation ecosystem is dependent on collaboration, interaction, mutual R&D, and sharing, as it is in a typical CME, on the other hand in certain other aspects, as it is in a typical LME, they tend to compete with the each other through maintaining their competitive advantages.

4.3.1.6 Conclusion for Collaborative R&D Activities

In LMEs inter-firm relations are mostly identified with “market relationships” and “formal contracts” (Hall & Soskice, pp. 30.31). In these markets, since business associations are not as strong as it is in CMEs, “collective standard-setting” is not

¹⁹ Interview number 6.

common (Hall & Gingerich, p. 453). On the other hand, in CMEs, inter-firm relationships are exercised mostly through business associations. In CMEs, firms tend to collaborate, the technological transfer is performed through mutual R&D, and technical knowledge is shared (Hall & Soskice, 2001, pp. 26-27).

In this MME case, when it comes to inter-firm relations, a high level of interaction is found. In the METU Technopolis ecosystem, firms are mostly interacting with other firms through various ways such as mutual R&D projects, contracting/subcontracting, technology transfer, and mentorship.

Firms carry out mutual R&D projects with the objective of acquisition of competency through cooperation. Through mutual R&D, they fill the operational gaps and provide better goods and services subsequently. In terms of mutual R&D, they have collaborative characteristics, similar to CMEs. Technology transfer is performed rarely, as it is in LMEs. Big state-owned companies carry out R&D projects with technopolis firms through sub-contracting. And even competitive firms can support each other through mentorship. In this context, the inter-firm relations theme of the case is close to the collaborative pattern of CMEs. Firm representatives mostly agree that through interacting and collaborating with other firms, they conduct R&D projects, hence they produce innovation.

4.4 Inadequate Vocational Training and Education System

4.4.1 Introduction to Inadequate Vocational Training and Education System

In the VoC literature, to overcome the coordination problem, “vocational training and education” is regarded as one of the five areas that firms in the market economy should establish competencies. Hence, firms should “equip the workforce with suitable skills” to overcome the coordination problem (Hall & Soskice, 2001, p. 7). In LMEs, education institutions mostly provide “general education,” while in CMEs sector-specific and specialization-based vocational trainings are provided (Ibid, p. 30). In the LMEs, due to a lack of strong industry associations, “collaborative training programs” are not provided (Hall & Gingerich, 2009, p. 453).

In the METU Technopolis case, the interviewees declared that in their ecosystem vocational training is deficient. Employees of the firms have generic educational backgrounds. For these reasons, employers mostly make investments in providing trainings to their employees. Particularly for jobs that require niche and specific competencies, firms make investments in employee trainings. Furthermore, particularly the employees of ICT firms actively participate in online trainings to enhance their skills. Online training option is an asset for start-up firms due to its affordability.

The representatives of mid-sized firms mostly emphasized the difficulty of talent attraction and retention. Due to the ongoing brain drain in Turkey, firms lose talent and for firms, it becomes more difficult to replace the talent. Since hiring new graduates or junior employees requires additional training costs for firms, the cost of replacement is also increasing. Hence, deficiency in vocational training in this ecosystem was mostly interpreted as a negative situation in the context of employee competencies and skills.

4.4.2 Deficiencies in Vocational Training

In the case study, in all of the interviews, participants declared that their employees mostly have a generic educational background that does not specifically match the requirements of their firms' job positions. Firms that do not require specific skill sets and backgrounds continue their business operations by employing junior employees or new graduates and providing them with on-the-job training afterward. The other firms which are specialized in certain areas have difficulties to attract relevant talents. Many of the participants declared that it is not realistic to expect university graduates to be adapted to the firm's positions exactly. Hence, it has been mostly voiced that the firms are obliged to invest in trainings to meet the deficit and ensure the adaptation. An interviewee pointed out that there is no clear match between academic background and job performance. He added that:

The employees mostly join our company with a basic educational background. It was similar to my case as well. I did research and we figured it out on my own. It did not happen like that 'We used to have the theory at school and let's turn it into a product.'²⁰

Despite that the job addressed in the interview requires technical background and a specific skill set, the interviewee highlighted the significance of on-the-job training and experience. And the theoretical background was not considered significant to have the relevant skills to perform the job. Furthermore, in other several interviews, the participants complained about the decreasing quality of higher education in the

²⁰ Interview number 1.

context of quick adaptability to the labor market as well. For instance, an interviewee mentioned that:

We observe that the quality level of higher education is gradually decreasing. We do not expect new graduates to perform tasks directly. Only 10% of new university graduates would be equipped to perform well in their first jobs.²¹

The interviewee addressed the problem that there is a mismatch between formal education and the skill-set needs of firms. In another interview, the representative pointed out that due to a lack of a strong vocational training system, they had problems getting efficiency from their recent employees. He added that:

In our country, there is no strong vocational training systematic. Computer programmers mostly acquire their skills with their efforts. We have a programmer who learned to be a programmer on his own via Youtube videos. In our business, there is a strong semi-skilled worker gap. In our sector, we come across high-school-level software interns who do not have strong basic education. In their schools, at the high school level, they are taught software without being taught mathematics or logic lessons properly.²²

Hence, in addition to the general education systematic, the significance of vocational training as it is ideally executed in CMEs is addressed as a gap in the Turkish market. The interviewees mostly expressed that to compensate for the competence deficiencies of their employees, their firms make investments to provide additional trainings. Hence, the competence gap in the labor market is mostly recovered with the individual efforts of the firms. Due to the skill and competency gap in the market, firms come across difficulties to attract and retain talents. Furthermore, they make investments to make their employees perform their tasks as they are requested.

²¹ Interview number 4.

²² Interview number 3.

4.4.2.1 Competency Development in Firms

In the case study, most of the interviewees declared that they provide trainings for their employees to make them equipped with adequate skills to perform tasks in a better way. Many firms' representatives (12 out of 17 firms' representatives) pointed out that they make investments in corporate trainings. According to the firm representatives, for particular positions, the provision of professional training is compulsory. These trainings are not organized centrally.

Due to specific requirements of their roles, they support their employees to receive trainings. For instance, an interviewee from a small-scaled firm pointed out that "Particularly at navigation and artificial intelligence related areas which represent the basis for our know-how, we need to train our employees. It is a specific area."²³ In another interview, the participant from a mid-sized ICT firm²⁴ emphasized that "Engineers have a particular formation and educational background. But the job we are performing is niche and specific, thus we need to invest in our employees' trainings." It was a repetitive theme in the interviews, many interviewees addressed this point. It was mostly emphasized that due to general educational backgrounds, employees need to be prepared for specific job tasks and R&D-related activities. And it was also pointed out that there is a talent shortage in the labor market for candidates with high qualifications to satisfy the requirements of specific jobs. An employee mentioned that:

We need to invest in our employees' trainings. We send them to trainings. It is a process, I think that area is deficient. In the market, there are limited human resources with adequate competence and skill sets.²⁵

²³ Interview number 10.

²⁴ Interview number 16

²⁵ Interview number 13.

Although vocational trainings were regarded as a deficiency in an MME, in several other interviews, the participants told that thanks to technological progress, new training options are possible for the employees. In certain areas, they have relatively easy access to online trainings due to the emergence of recent online training platforms. For example, an interviewee from an ICT firm mentioned that “our employees try to enhance their skills through online trainings. They do research for online trainings or we guide them to receive these trainings”²⁶. Online platforms provide equal opportunities for employees to reach professional trainings easily which can be regarded as a competitive advantage for start-up firms. For instance, the representative of a micro-scaled healthcare firm²⁷ pointed out that “we are mostly interested in the talent. The talent who has analytical skills. When we attract these talents, they can improve their skills with open internet sources. There are accessible online trainings.” Online trainings can be considered an opportunity for micro-scaled organizations, start-ups, and firms under the incubation phase which has limited financial resources. Particularly, firms operating in the ICT area have more opportunities to access online trainings.

Furthermore, in an interview, the representative of an electronics firm²⁸ emphasized that training is a big cost item for small and mid-sized enterprises. Despite they make an effort to invest in their employees’ competencies, after a while when they gain sufficient expertise and training, they change their career paths and start to work for big companies. He added that:

²⁶ Interview number 4.

²⁷ Interview number 2.

²⁸ Interview number 6.

It is really difficult to find a skilled engineer and R&D personnel in Ankara. It is expensive to employ a qualified engineer. Since we cannot do it, we hire less qualified people and train them. You make them receive trainings regarding software and programs that they should use. After a while, they leave the firm and start working for big companies. It is difficult to retain employees.”²⁹

Training costs of firms do not assure the continuity of business through retaining talents. On the contrary, it is a vicious circle for firms to train employees on a permanent base under a high turn-over-rate environment. Firms may consider the training investment as a barrier to retaining talents since it may increase the chance of these talents leaving the firm.

4.4.2.2 Negative Externality of Brain Drain Trend in Turkey

In the case study, when it came to talent attraction and retention, several interviewees addressed the brain drain trend in Turkey. These participants emphasized that despite that they invest in their employees to enhance their capabilities and competencies, due to the ongoing brain drain trend in Turkey, it is becoming more difficult for them to replace these talents. Providing trainings for employees requires time and creates a cost burden for firms. For instance, the interviewee from a micro-scaled Electronics firm pointed out that:

Five years ago, there were skilled people in our labor market. There were many engineers in the talent pool from various age groups. However, after many people decided to move abroad, mostly mid-level engineers left the country. This is the biggest problem of today. The sector mostly has engineers older than 45 years old and new graduates. The mid-level has disappeared.³⁰

The talent shortage for the ones with mid-experience levels has been addressed in this experience. Hence, the labor market mostly consists of junior employees with

²⁹ Ibid.

³⁰ Interview number 17.

limited experience and senior employees who are about to be retired. An interviewee from an ICT firm pointed out that:

High-skilled people in our team are moving abroad. We have a high level of circulation. We do not have time to retrain inexperienced engineers. When we train them, they move abroad at a point. It is difficult to invest in an employee.³¹

In the interviews, the brain drain trend in Turkey was addressed as an issue that made retention of the employees difficult for firms. Since trained employees tend to move abroad when they gain experience, firms tend to regard the training investment as a waste of firm resources. In an environment that has a limited talent pool, it would be more difficult for firms to attract highly skilled talents. Hence, the labor market has a bigger talent shortage problem due to this ongoing brain drain trend.

4.4.3 Conclusion for Inadequate Vocational Training and Education System

As is addressed in the literature, vocational training and education are the areas in that firms should establish competency to overcome their coordination problems. In this MME case, the deficiency in vocational training was emphasized by all participants. It was mentioned that employees in the firms have a general educational background. In this context, this case has similarities with the general education characteristics in LMEs (Hall & Gingerich, 2009, p. 453).

In the case study, it was primarily addressed that due to deficiencies in centrally-organized vocational trainings, firms need to invest more in employee trainings which creates a cost burden on the organizations. Particularly, for small-

³¹ Interview number 7.

scaled firms training an employee is a big cost item. Furthermore, due to the high level of circulation in the market, they cannot retain the talents that they have invested before. In business areas such as ICT, thanks to the emergence of online training platforms, employees find an opportunity to have access to trainings in a cost-effective way. However, trainings for specific job areas with niche requirements are provided effectively as it is in ideal-typical CME cases. Talent shortage, competency deficiencies, increasing training costs, and difficulties in talent retention were provided as leading themes. Hence, in this context, as an input for the innovation process, labor is regarded as a significant asset for the firms. Due to the narrowing labor market, firms are experiencing pressure which would have a negative impact on their innovation performance in the mid-run.

4.5 Inefficient Corporate Governance

4.5.1 Introduction to Inefficient Corporate Governance

To overcome the coordination problem, VoC assumes that firms should establish competencies in “corporate governance” which is “access to finance” (Blyth, 2003, p. 216). Besides, the VoC approach suggests that in a market economy firms should access financial resources to assure return on their investments. For them to have a high performance, they should “secure their funds” (Hall & Soskice, p. 7). In the case study, interviewees mostly declared that in this ecosystem it is difficult to fund R&D and innovation-related activities. Hence, due to the inadequacy of financial resources, they cannot reach their potential level.

4.5.2 Funding R&D Activities

When it comes to carrying out R&D activities and producing innovation consequently, having the required financial resources is a significant component in the process. For this reason, in the VoC, corporate governance is highlighted as one of the key five areas in that firms should establish competency. In the case study, most of the interviewees (11 out of 17 firm representatives) emphasized that it is difficult for them to fund their R&D and innovation-related activities.

Most of the participants (10 out of 17 firm representatives) declared that due to the inadequacy of financial resources, their firms' performance cannot reach its ideal level. Hence, they cannot actualize their potential. Independent of the firm scale, participants from micro-scaled, small-scaled, and medium-scaled enterprises told that they have difficulties funding R&D and innovation-related activities.

On the other hand, during the interviews, most of the firm representatives stated that at various stages of their firms' business process, they have benefited from government funds, incentives, and grants. Government institutions such as TUBITAK (Scientific and Technological Research Council of Turkey) or KOSGEB (Small and Medium Industry Development Organization) were addressed by many interviewees and they have declared that they have been benefiting from these institutions' funding programs. In addition to that, thanks to being located in the technopolis, they benefit from technopolis-oriented incentives, particularly on labor cost compensation.

4.5.2.1 Incentive Utilization for R&D Projects

In the case study, operating in a technopolis brings along certain financial advantages for firms. These incentives are provided by the state for all technopolis firms in certain areas such as tax breaks and payroll advantages. In addition to these default advantages, several technopolis firms benefit from cash incentives or subsidies provided by certain state institutions to fund their R&D activities and projects.

In the case study, the majority of interview respondents (9 out of 17 firms' representatives) explained that they have been benefiting from state incentives, funds, or grants. Particularly, two state organizations, TUBITAK and KOSGEB were frequently addressed during the interviews, and half of the firm respondents mentioned that they are involved in these organizations' funding programs to initiate or support their R&D and innovation-related activities. In addition to technopolis-related incentives, to fund their R&D activities, firms make an effort to be included in incentive programs. The beneficiaries mostly declared that they find these incentives useful to fund their R&D operations.

The representatives of small-scale firms that benefit from state incentives mostly declared that incentives were vital for their firms' survival and the continuity of their business operations. Furthermore, a representative of a medium-scaled ICT firm pointed out that they conduct R&D-related activities under projects which are supported financially by state organizations. He mentioned that:

We do R&D in the projects that are incentivized. We try to be included in a program that corresponds to our R&D agenda. We do not directly do R&D, we do R&D while we are carrying out a project which is incentivized.³²

This statement reflects that for a medium-scaled enterprise, funding an R&D project may still be very essential for a firm's R&D performance. Small and medium scaled enterprises may not fund their R&D projects via their resources. Particularly, the new firms which are at the beginner step are dependent on new resources when it comes to funding their R&D activities. In the latter stages, incentives make their R&D activities accelerated. For instance, in another interview, the respondent from a small-scaled ICT firm mentioned that

In the beginning, funding was more critical, but now incentives are more critical for us. We can utilize our resources for funding our R&D projects now. However, incentives support us. If we would not be supported, our R&D projects can slow down. Incentives make our R&D projects accelerated. In another case, we can still do R&D but in a slower way. Incentives make things faster.³³

While for certain firms, state incentives are essential to carry out their R&D activities, for other ones though it has a complementary function, it still has an essential role to accelerate firms' R&D activities. Independent of the scale of the firms, incentives function as catalysts for firms' R&D activities. For instance, the representative of a big scaled enterprise mentioned that as a big-scaled company, they are benefiting from several incentive programs to carry out R&D activities and he added that:

If these incentives would not exist, firms would not be able to execute as many of these R&D projects. If there would not be these incentives, that much human resources could not be allocated for R&D projects, hence R&D ideas.³⁴

³² Interview number 4.

³³ Interview number 14.

³⁴ Interview number 8.

Incentives are regarded as catalysts to execute R&D projects. Furthermore, the representative of a small-scaled environment firm declared that

These incentives are significant for businesses. Especially for a journey of ten steps, at the first step incentives are critical. If the firm survives, after three years these incentives lose their meaning.³⁵

Hence, particularly for start-up firms, new enterprises, and firms under incubation processes, incentives are regarded as essential. Though, it may be less vital in the later phases, during the establishment phases, thanks to these incentives firms make significant progress.

On the other hand, almost the other half of the interviewees declared that they do not benefit from state incentives. For several reasons such as difficulties caused by the bureaucratic process or depreciation of incentive values due to increasing foreign exchange rates, these interviewees think that incentives are not as essential as they used to be for their businesses. In addition to these factors, in certain interviews, it was also declared that the firms in the innovation ecosystem should not be dependent on incentives and they should learn to fend for themselves.

4.5.2.1.1 Difficulties Due to Bureaucratic Processes

In certain interviews, it was emphasized that due to the complexity and difficulty of bureaucratic processes, several firms make significant efforts to benefit from state incentives. It was pointed out that striving with red tape requires a significant amount of effort, endeavor, and resources, which may be a discouraging process for the firms. For instance, an interviewee emphasized that:

³⁵ Interview number 11.

When we would like to purchase a tool, to explain our need to utilize it, we do correspondence three or four times. The relevant institution should approve it. For it to be classified as an R&D activity, it needs to be approved. I think if the firms would be classified/labeled as R&D firms and ‘others’ at a higher level and bureaucratic processes can be eased, in that case, we can act more independently and do more R&D.³⁶

The length of the process and the complexity of the evaluation processes were addressed as obstacles against the effective utilization of incentives in a few other interviews too. For instance, the participant from a mid-sized firm emphasized that:

The incentive process is more difficult than the R&D process itself. You make more effort in this process. You deal with the paperwork. You are funded and as a response to that you are obliged to make a report for it. However, since this process is really difficult and you are subject to audit, maybe it would be preferred to not receive incentives and find other ways for funding.³⁷

On the other hand, the scope of R&D ideas was also highlighted as an obstacle to receiving incentives. For instance, the representative of a small-scaled firm emphasized that since there is no consensus over the R&D concept among the stakeholders of the innovation ecosystem, it is difficult to explain an R&D idea and make it incentivized. He pointed out that:

In terms of funding R&D projects, we come across difficulties. For this reason, we applied for incentives. However, sometimes we cannot explain our R&D goals to committees, referees, and institutions well. Your R&D ideas may not be regarded as R&D ideas by these institutions. The R&D concept can be regarded differently by different stakeholders. For me, R&D may mean reproducing a current product or adding a feature to a product in our portfolio. However, it can be rejected by academics in the committees.³⁸

Furthermore, several participants highlighted that outcome-based incentivization is regarded as an obstacle to effective R&D processes in niche areas since the R&D process may not end up in a product immediately due to the complexity of the process. Hence, in more niche technology areas, R&D projects may not yield

³⁶ Interview number 1.

³⁷ Interview number 4.

³⁸ Interview number 15.

concrete results immediately and products may not be released and launched easily. Hence, this commercialization barrier may be regarded as a deterrent factor for their projects to be funded or incentivized easily. An interviewee from a small-scaled environment firm mentioned that:

Funding is a big problem for firms. It is difficult to provide funding for an R&D project. You make an effort to do R&D and bring up a product outcome in the end. Some firms do R&D which does not produce a concrete output. To avert this misuse of incentives, righteously, the relevant institution monitors the process of the product as well. Though it looks like a good practice, in niche areas, commercialization cannot occur immediately. Some R&D projects make money in the short term, while others may not. It should be distinguished.³⁹

In another interview, the participant of a micro-scaled interviewee also pointed out that investors or funding agencies have hesitations towards start-ups' R&D processes due to the long-term effort that a product to be released as an output in the end. He added that

In Turkey, in recent years, there is significant progress in investment processes. But, when it comes to deep-tech technology ventures, there is no significant investment. Everybody expects immediate sales. However, it requires investment and funding.⁴⁰

Certain interviewees emphasized that the simplification of application and review processes for the incentive processes may increase their R&D performance if they would benefit from these programs easily. In addition to that, it was also emphasized that in niche technology areas that require much more investment to convert R&D inputs into concrete products and outputs, incentivization processes may be revisited accordingly.

³⁹ Interview number 11.

⁴⁰ Interview number 2.

4.5.2.1.2 Foreign Exchange Rate-Related Difficulties

In the case study, certain interviewees highlighted the declining purchasing power of incentives due to the depreciation of local currency towards foreign exchange rates. It was raised as a problem when it came to assessing the significance of incentives over the R&D performance and competitiveness of the firms. For instance, a representative of a small-sized firm highlighted that upper limits for incentives were not revised according to depreciation towards the exchange rate, which decreases the impact of incentive utilization over firms' competitiveness. He added that:

Nowadays, the ICT sector in Turkey is under a sustainability threat. More and more qualified software personnel are working remotely for European software companies and they are paid salaries in USD or EURO terms. The volatility of the exchange rates causes our qualified workforce to prefer to work for foreign companies. To compete with them, we try to receive incentives. But if these problems would continue, for ICT firms it will be difficult to find qualified employees.⁴¹

On the other hand, in addition to the competitiveness problem, another participant from a mid-sized firm pointed out that they cannot procure hardware easily due to exchange rates. In addition to that he stated that “in the previous terms, we were receiving TRY-based incentives, you make your procurement plans, however in the upcoming two years, due to the depreciation, the incentive you receive does not help you to cover your expenses.”⁴² Hence, in terms of procurement and purchasing power, the depreciation of the currency was highlighted as a current obstacle to the R&D performance.

⁴¹ Interview number 3.

⁴² Interview number 4.

4.5.2.1.3 The Need For Self-Contained Firms

Despite that incentives were addressed as powerful tools to increase the R&D performance of firms, several interviewees pointed out that firms should not be dependent on incentives and they need to be self-contained to sustain their businesses. Though at the initiation phase, incentives may be essential to gain momentum, in the long run depending on incentives to sustain the business is criticized by several participants. They suggested the provision of incentives to be maintained at an optimal level and firms need to learn to survive by themselves in the aftermath. For instance, the interviewee of a mid-scaled firm mentioned that “for new ventures, dependency on incentives may be required at a certain point, but after that being financially independent may be significant.”⁴³ This point was also highlighted in another interview. The interviewee mentioned that “after reaching a certain firm size, incentives would not be distinctive due to various reasons such as exchange rate effect, firm size, etc.”⁴⁴ Hence, incentives were regarded as vital tools to provide momentum for firms at the initiation phase.

An interviewee from a big-scaled firm suggested that incentives should be provided for commercialized products rather than the R&D projects solely. It should be result oriented and marketing and sales aspects should be prioritized. He mentioned that:

⁴³ Interview number 1.

⁴⁴ Interview number 10.

The system should be designed in a more balanced way. The system should not only be dependent on incentives and funding. The designation should be more balanced. I think the more difficult part is to do marketing for a product and make it convenient for international sales. Incentives should be focused on this area. Currently, innovation is related to R&D, but it should be related to the commercialization part.⁴⁵

Despite that many of the interviewees compromised on the significance of R&D incentives, several participants highlighted that incentives are rather essential at the initiation phases. For bigger scaled firms that have more mature processes, products, and service portfolios, it functions as a complementary factor.

4.5.3 Conclusion for Inefficient Corporate Governance

In the VoC, corporate governance is regarded as one of the key areas that firms should have competencies. Access to finance is considered significant for firms to solve their coordination problems. In LMEs, access to finance is mostly dependent on firms' success in equity markets. Due to the lack of "close-knit networks," firms' financial success is dependent on their valuation. Their market value mostly determines the accessibility to finance. M&A activities are common in these markets as well (Hall & Soskice, 2001, pp. 27-29). On the other hand, in CMEs there is a "bank-led financial system" (Witt & Jackson, 2016, p. 781). Firms in CMEs mostly depend on "patient capital" which makes it possible for these firms to make long-term investment plans. Due to business networks and industrial associations, firms can reach the business data in the market (Hall & Soskice, 2001,

⁴⁵ Interview number 8.

pp. 22-23). Hence, the corporate governance structure is mostly based on cooperation among the financial stakeholders in the market economy.

In the case study conducted in METU Technopolis, most of the firm representatives declared that it is difficult to fund their R&D activities. Due to the inadequacy of financial resources, they declared, they could not be able to reach their potential. Independent of the firm scale, difficulties in funding R&D activities have been emphasized in the majority of interviews. In contrast, more than half of the firms' representatives stated that they benefit from state incentives at various levels. In addition to technopolis-specific incentives, these firms incentivize their R&D-related projects as well. However, they still declared that when it comes to funding R&D activities, they come across difficulties. Besides, several interviewees declared that due to difficulties in bureaucratic processes and depreciation of incentives in terms of foreign exchange rates, they cannot benefit from incentives as much as they idealize. To conclude, the corporate governance structure in an MME is found inefficient by the participants. In MMEs, access to finance is not as easy as it is in ideal-typical market economies.

4.6 Average Employee Involvement in Decision-Making for R&D Processes

The VoC literature assumes that establishing competency for the “employees” is one of the key five areas to overcome the coordination problem. To prevent internal coordination problems, firms are suggested to establish this competency. Through this competency, it is expected that “adverse selection,” “moral hazard” and “information sharing” related problems will be averted (Hall & Soskice, 2001, p. 7).

In the case study interviews, participants went into the division of two groups. The majority of interviewees (9 out of 17 interviewees) declared that R&D-related projects of their firms are mostly unilaterally triggered by the top management or are conducted through client requests. Besides, the other firms' representatives (8 out of 17 firms) declared that their employees have relatively more active involvement in the R&D and innovation-related projects.

Particularly in electronic firms, the R&D process is mostly triggered by the top management and clients. On the other hand, during the interviews, the representatives of ICT firms mostly stated that the employees in this area have more involvement in the formulation of R&D projects, and their ideas are converted into concrete projects. The scale of the company does not have a meaningful impact on employee involvement in R&D processes. Half of the micro-scaled or small-scaled firms' representatives stated that their R&D projects are driven by management or client requests. Due to their compact structure, these firms have a more fluid organizational structure and the roles within the organization are more interchangeable. In contrast to the agility they have, half of the representatives of these firms still reflected that their R&D projects are triggered by the decision of their top management or clients.

Despite that the responses have mixed characteristics, the representatives of eight firms in this sample emphasized that in their organizations' employees have a right to participate in R&D-related or innovation-based activities, their ideas are taken into consideration and they have an impact on the formulation and implementation of R&D projects.

The participant from a micro-scaled firm pointed out that the compact structure of the company forces them to be agile, hence when it comes to the daily tasks, the CEO of the firm performs routine tasks such as coding. On the other hand, the software developer of the firm has a marketing and sales executive role as well.⁴⁶ Due to the scarce human resources they have, they have holistic roles which equalize the employees. They have more flexible and interchangeable roles. During the interview, the participant highlighted that as a team, they make decisions regarding their upcoming projects together. However, when the firm will grow, the division of duties, specialization, and concentration would be inevitable, he added. In another case, the representative of a small-scaled firm mentioned that:

When we initiate a new project, we set brainstorming sessions with the team. It takes around two or three sessions. All the team members present their ideas in these meetings. The members may present their additional ideas anytime they want. We do R&D development together. We run an open process and I think we perform pretty well.⁴⁷

During the interviews with ICT firms, it was observed that they are more open to the new ideas of their employees within the R&D processes. ICT firms that continuously work on developing new products or services provide more options for their employees' involvement in the R&D process. From the initial phases of brainstorming, idea sharing to product development and marketing, they carry out the project with the inclusion principle. In certain circumstances where the client identifies the requirements and draws the framework, the team can still present their ideas to shape the client's request and enhance it regarding their expertise. Despite that the employees may not have full autonomy towards the development of the

⁴⁶ Interview number 2.

⁴⁷ Interview number 3.

product, they still share their opinions accordingly. For instance, an interviewee from a medium-scaled firm pointed out that the firm may have a high-level defined vision created with in-depth market and competitor analysis and for this reason, the products are developed within the framework of this vision. In this case, the employees do not have big opportunities to recreate the projects. He added that:

We develop applications. It does not matter whether the employees have great ideas, we do not put away our applications through considering these ideas. Our scope is defined, and we have identified products, when it comes to improvements on defined products or new features, the employees' ideas are taken into consideration. In all technology firms, the R&D process is mostly carried out in this way.⁴⁸

Due to the nature of their professional area, ICT firms involve their employees in the R&D processes further. They regard their employees as a source of new ideas and to motivate them to produce more innovative business ideas, they design specific programs to collect their ideas and support them in progressive ways.

In several interviews, it has been pointed out that to encourage their employees to come up with innovative ideas, products, or new business models, they launch specific programs for their employees. For instance, the representative of an ICT firm⁴⁹ pointed out that they have designed a specific innovation program to collect their employees' ideas. Thanks to this program, they do not only collect the ideas but if it is approved, they allocate resources for employees to convert their ideas into concrete projects and implement them accordingly. They even utilize this tool as a new way of employee engagement as well. In another interview conducted with a mid-sized ICT firm, the participant pointed out that they support their employees' innovative ideas. If they think that these ideas are feasible commercially,

⁴⁸ Interview number 13.

⁴⁹ Interview number 8.

they even establish spin-off firms to turn these ideas into new business organizations.⁵⁰

In firms where employees do not actively participate in the R&D processes by sharing their ideas, there are certain barriers against their involvement. First of all, the vertical hierarchy in the organizations is regarded as the primary barrier against employees' involvement in the decision-making process for R&D projects.

According to the representative of a mid-sized, since the organizational structure is pyramidal, the decisions regarding product development are made at the top management level, and R&D projects addressing these products are formulated at the mid-management level. Hence, the bottom-up approach is not working to formulate R&D projects.⁵¹

Second of all, in certain firms expertise and experience level are regarded as vital to be able to formulate and implement R&D projects. For this reason, employees that do not have sufficient experience are not included in the R&D processes. R&D and innovation-related tasks are reserved for senior employees. For instance, the representative of a small-sized firm pointed out that

Our area requires technical knowledge. For this reason, the employees do not present us with feasible business ideas. Sometimes they come up with ideas with the alleged aim of changing the world in a different direction. However, in the end, they are not realistic.⁵²

In another interview, the participant of a small-sized ICT firm told that they run a top-down R&D approach since the management is experienced at what they are performing. Hence, thanks to the sectoral experience they have, they provide

⁵⁰ Interview number 7.

⁵¹ Interview number 1.

⁵² Interview number 11.

opinions, formulate R&D projects, and delegate project tasks to the teams.⁵³ In another business area, electronics, the participant of a micro-sized firm⁵⁴ also added that engineering is performed through the mentor system, hence the seniors should guide the juniors for them to be making progress in having solutions. He emphasized that innovation in a firm is the duty of the “senior ones.” To conclude, in certain firms making R&D-related decisions is regarded as a senior task that requires experience and expertise. For this reason, more junior employees are not included in the process.

Third, the firms which are positioned under certain ecosystems such as defense and aerospace are mostly carrying out projects, as sub-contractors, for big players in the industry. Hence, their tasks are pre-given, well-structured, and standardized. For these reasons, employees’ maneuvering area is limited. For instance, the representative of an electronics firm mentioned that in their projects, they are subject to technical specifications defined by their client. Hence the design and R&D process is obliged to be in line with the client’s request.⁵⁵ In the technopolis, there are many firms, operating as solution providers to big industry players which limits their autonomy in leading R&D processes on their own. In certain cases, firms may be given more flexible tasks. For instance, the participant of an ICT firm⁵⁶ pointed out that the client only declares their need, and, as a subcontractor, the firm provides a customized solution. Hence, they evaluate whether there is a need for developing a new product or ways to optimize the project output.

⁵³ Interview number 14.

⁵⁴ Interview number 17.

⁵⁵ Interview number 5.

⁵⁶ Interview number 4.

In terms of operations, they are more flexible, but in the end, the outcome is predefined and they are working within an identified scope.

In conclusion, in the METU Technopolis ecosystem, employees do not mostly involve in the decision-making processes for R&D-related activities. Hence, in the MME structure, a LME-like approach is adopted. In LMEs, top managements have a unilateral approach over the firm (Hall & Gingerich, 2009, p. 453). Hence, employee involvement in the decision-making processes is limited. In the firms of LMEs, decisions are mostly made at the top management level. In contrast of that, in CMEs top management does not have unilateral control over their firms. Through certain mechanisms such as “supervisory boards,” employees are involved in the decision-making processes. Hence, R&D-related decisions are also made collaboratively (Witt & Jackson, 2016, p. 781). In the MME case, R&D-related decisions are mostly made unilaterally. Hence, top managements have control over the formulation of R&D projects. Particularly, firms operating in the electronics area carry out projects upon the directive of top management or client requests in a unilateral way. On the other hand, in ICT firms, R&D decisions are mostly made collaboratively. Innovative ideas and new business model suggestions are supported in these firms. In general, the vertical hierarchy, expertise and experience level, and inflexible client requests can be considered barriers to employee involvement in the R&D processes.

4.7 Limited Impact of Industrial Associations on Firms' Innovation

Performance

In the VoC, one of the key five areas in that firms should establish competency is “industrial relations.” Firms are expected to establish competency in industrial relations to coordinate their labor-related issues (Hall & Soskice, p. 7). Industrial coordination enables firms to identify “regulation of wages and working conditions” (Feldmann, p. 833). In addition to that, in the context of high innovation performance, interaction with business associations in the market provides advantages for firms.

In the field study of METU Technopolis, most of the interviewees (11 out of 17 firms) declared that they are interacting with industry associations or other big stakeholders (major contractor companies, government institutions, or agencies) in their innovation ecosystem. This interaction supports their business activities. However, despite that they interact with business associations for various reasons, at the overall level, its impact on their innovation performance is regarded as indirect.

Several interviewees pointed out that they are actively participating in the activities of several business associations, which are particularly conducting activities in their business areas. And these associations have a positive impact on their innovation performance. In these interviews, Technology Development Foundation (TTGV), Turkish Informatics Association, and Software Manufacturers Association (YASAD) were addressed as the several foundations and associations that have a positive impact on firms' innovation performance.

Sectoral associations provide support for firms in different areas. For instance, an interviewee from an ICT firm pointed out that:

We have active positions in business associations that are related to our operational area. We provide support for these associations. In terms of reputation, they are assets for us. Thanks to them, we increase the level of recognition. It has an indirect effect on our innovation performance as well. If you become a reputable firm, people would like to work in your company. Hence, these associations have a positive impact on our human resources and PR activities. Furthermore, these associations provide a convenient ground to reach public institutions. We provide insights about our business to related institutions as well.⁵⁷

Interaction with associations is mostly addressed in the context of sectoral reputation, recognition, and PR effect. These institutions provide a ground for different stakeholders to interact. Furthermore, business associations mediate between firms and relevant public institutions. In an interview, the representative of a small-sized firm emphasized that at the establishment stage, they received mentorship from the development agency. Besides, they participated in the events of the agency, and thanks to this participation their visibility has increased.⁵⁸ Hence, mentorship is one of the contributions of associations that help firms to enhance their innovation capabilities.

In the interviews, when it came to interaction with stakeholders in the market, leading firms in the industry and state institutions that provide financial support for firms were addressed as well. The participants of firms working with big state-owned defense companies as sub-contractors mentioned that they are interacting with these companies, such as ASELSAN. In addition to that they are in interaction with other sector stakeholders such as the procurement authority, the Presidency of Defense

⁵⁷ Interview number 13.

⁵⁸ Interview number 11.

Industries (SSB), and the Turkish Defense and Aerospace Industry Manufacturers Association (SASAD).

When it comes to financial support, The Scientific and Technological Research Council of Turkey (TUBITAK) and the Small and Medium Industry Development Organization (KOSGEB) were addressed in several interviews as the institutions that the firms are interacting with. Several firms' representatives mentioned that to benefit from the grants under certain programs, they are interacting with TUBITAK and KOSGEB. Particularly, in certain interviews, the interaction with TUBITAK was addressed as critical support for the continuity of their businesses. For instance, an interviewee pointed out that "TUBITAK provides really useful incentives which should not be underestimated"⁵⁹. TUBITAK's Technology and Innovation Funding Programs Directorate's (TEYDEB) incentives were also referred to in the interviews. The representative of a mid-sized firm mentioned that "to develop a product and conduct an R&D project, you need funding and resources. For this reason, to receive an incentive from TEYDEB we put new practices into action."⁶⁰

To conclude, the case study demonstrated that firms in the METU Technopolis ecosystem have been interacting with industry associations, leading companies, and relevant state institutions. However, these interactions' impact on their innovation performance is found limited. Certain firm representatives mentioned that thanks to a high level of interaction with certain industry associations, their innovation level is higher. However, at the overall level, the interaction with

⁵⁹ Interview number 16.

⁶⁰ Interview number 5.

industry associations is found limited. On the other hand, thanks to interaction with leading firms and relevant state institutions, firms' R&D-related activities are supported.

In CMEs due to strong industry associations, firms have a ground to collaborate. On the contrary, in LMEs, due to a lack of strong industry associations, market standards are identified by "market races" (Hall & Gingerich, 2009 p. 453). In the MME, when it comes to industry relations, an LME-like approach is observed.

4.8 Significant Impact of Place-Specific Factors and Local Resources on Technopolis Firms' Innovation Performance

4.8.1 Introduction to the Impact of Place-Specific Factors and Local Resources

VoC literature assumes that strong institutional complementarities and macro-level coordination are prerequisites for high innovation performance in a market economy. On the contrary, SI literature suggests, independent of macro-level institutional setting and coordination, high innovation performance would still be possible thanks to place-specific factors and local resources. SI considers innovation in the context of "systemic interactions between the various components" (Soete et al., 2009, p 7). Besides, an innovation system is conceptualized at various levels like "national," "sectoral," "regional" and "corporate innovation systems" (Granstrand & Holgersson, 2020, p.2). In SI, "innovation at the aggregate level" is regarded as the outcome of an interactive process. Thus, with the involvement of various micro-level stakeholders, innovation at a high level can be produced (Soete et al., 2009, p. 7).

In an innovation ecosystem at the sub-national level, “specific local” and “regional resources” could be considered assets to firms’ competitiveness (Asheim & Isaksen, 2002, p. 77). As it is formulated within the theoretical framework of RIS, the competitiveness of regions is based on “firm-specific competitiveness,” “learning process” and “localized capabilities such as specialized resources, skills, institutions and share of common social and cultural values” (Doloreux & Parto, 2005, p. 134).

During the case study in METU Technopolis, many firm representatives (8 out of 17 interviewees) directly emphasized that at the overall level being in METU Technopolis has a positive impact on their innovation performance. Representatives of firms operating in various sectors such as ICT, environment, machinery, and electronics declared that thanks to being a part of the technopolis ecosystem, their firms’ innovation capacity is enhanced. It has been declared that the dynamic atmosphere of the technopolis and the synergy created in this environment have a positive impact on the innovation performance of firms. On the other hand, in several other interviews, it has been declared that though METU Technopolis has an indirect impact on firms’ innovation performance, thanks to the ecosystem, their innovation performance is still increasing due to several reasons such as “being a visionary firm,” “dynamic entrepreneurship ecosystem” or “marketing advantages.” For example, an interviewee pointed out that:

I think being in METU Technopolis does not have a direct impact on our firm's innovation performance, but it has an indirect impact. Being a part of the METU ecosystem provides a vision for our firm. In this dynamic entrepreneurship-oriented environment we follow other actors' moves as well. This dynamic atmosphere has an impact on the direction of our firm. When it comes to opening up to foreign markets, and activities, you benefit from this dynamic atmosphere. I think it contributes much more to the start-up side.⁶¹

In the case study, the word “synergy” is voiced many times to identify the impact of technopolis on the innovation performance of firms. Synergy is mostly identified with the interaction of various stakeholders in an innovation ecosystem. Being in the same location and having a similar background were mostly addressed as the variables of this synergy. For instance, an interviewee of an electronics firm pointed out that “There is a high level of synergy in METU Technopolis. R&D employees know each other. They are even classmates. They are in the same location, working together at a close distance”⁶². Besides, the interviewee of an ICT firm also added that “The raison d’etre of technopolis is the synergy. We conduct projects together. We make so much effort on it.”⁶³ Interviewees underlined the significance of the “dynamic environment” and “synergy” in it. The interaction among firms, co-conduct of projects, and social ties among employees are regarded as the components of this synergy. And thanks to this synergy, a high level of interaction, high innovation is achieved.

In terms of a small firm, being in a technopolis has several other advantages. Particularly, the firms in the incubation or initiation phase benefit from the dynamic environment of the technopolis and its infrastructure. For instance, the interviewee of a small-sized firm stated that:

⁶¹ Interview number 10.

⁶² Interview number 6.

⁶³ Interview number 9.

Being in METU Technopolis has a positive impact on our firm's innovation performance. For this reason, we keep staying in this area. If you start over, as a start-up company you apply for the incubation process. You are exposed to the incubation process and audits. You need to convince several people. But this is a good scenario for beginners. You own an office, you stay in the incubation process, and you are provided a good place to do R&D. Things change when the scale of your business changes.⁶⁴

From the standpoint of the interviewee, the technopolis allows new ventures, start-up firms, and talented entrepreneurs who have limited capital. By adapting to the ecosystem, they are included in an innovation environment where they can grow their business. In addition to that, for all the firms it paves the way for interacting with many stakeholders. Another interviewee from an ICT firm highlighted this point as well. He mentioned that:

The technopolis has a positive impact on firms' innovation performance. The degree of impact is varied, however, it has a positive impact on at least building business cooperation among firms. Besides, it provides opportunities to work with academics at the university side.⁶⁵

Hence, the synergy in technopolis is regarded as the outcome of the interaction of firms and their cooperation with other technopolis stakeholders.

During the interviews, most of the interviewees emphasized the advantages of being in a technopolis. These advantages stem from certain factors such as agglomeration, incentives, location, and social atmosphere. However, when it comes to assessing the overall impact, several firm representatives had a neutral stance on the impact of being in a technopolis over the innovation performance. These interviewees mostly declared that except for financial benefits or social atmosphere, the technopolis does not particularly have an impact on their innovation performance. For example, the representative of an ICT firm stated that:

⁶⁴ Interview number 11.

⁶⁵ Interview number 8.

In terms of innovation, the technopolis does not provide you with an advantage. On our R&D projects, it does not have an impact. We do not act in unison. Thus, if I would assess the overall impact, I would say ‘neutral’.⁶⁶

Thus, this interviewee underlined the fact that their R&D activities are run independently and their innovation performance is not related to technopolis-specific factors. The interviewees who have more of a neutral stance underlined the significance of technopolis-specific incentives and economic advantages. They mostly degraded the impact of technopolis on their firms’ innovation performance to the technopolis incentives. For instance, an interviewee emphasized that:

If we would not located in the technopolis, but we would have financial interdependence, we would be performing in the same way. Unfortunately, I cannot say that ‘Luckily we are in the technopolis and thanks to this, we do this work’.⁶⁷

Hence, the interviewee underlined the significance of financial incentives of the technopolis. He implies that other than the financial benefits, the technopolis does not provide any other significant advantage for the firm’s innovation performance. Another similar opinion was voiced in another interview as well. The interviewee pointed out that:

I think being in the technopolis does not have a big positive impact on our firm’s innovation performance. In terms of the place, it is not significant to us. Ultimately, it has economic advantages. There is no specific reason that led us to choose METU Technopolis. We choose this place because of the incentives. In addition to that our employees love to be working in this area.⁶⁸

In this interview, the significance of the financial benefits of technopolis was underlined. Plus, the employee added the social benefits of the technopolis from the employees’ perspective. This social dimension is voiced in another interview as well. The representative of a mid-sized ICT firm emphasized that

⁶⁶ Interview number 15.

⁶⁷ Interview number 1.

⁶⁸ Interview number 14.

Being in the METU Technopolis does not have a significant impact on our firm's innovation performance. However, it has an impact on employees' happiness and well-being. Thus indirectly it would contribute to the innovation success.⁶⁹

Hence, in this context, the technopolis is defined as an ideal social workplace where employees feel happy. And thanks to the well-being of employees, this social atmosphere may have a positive side impact on innovation performance. On the other hand, the representative of a small-sized ICT firm emphasized that when it comes to the culture of co-creation, the technopolis does not provide a proper ground to produce collectively. He stated that:

I do not personally think that technopolis has a high impact on our firm's innovation performance. If we would not know the firms, probably we would not have run mutual projects. I think the mutual project is not a part of our daily business culture. Doing business within your network is culturally more common. Hence, if we would not in METU Technopolis, we could still cooperate with other firms. I think this technopolis does not provide us with an elusive ecosystem.⁷⁰

When it comes to asking for the overall impact of place-specific factors, several negative responses were also received. However, after posing detailed questions about the individual impacts of the technopolis over innovation performance at various sub-topics, firm representatives who have neutral stances have also juxtaposed the individual positive impacts such as financial benefits and social advantages.

In the interviews, most of the firm representatives declared that being in a technopolis has advantages at various levels. Half of the interviewees pointed out that the technopolis has a direct impact on their high innovation performance. The other interviewees mostly pointed out that the technopolis has an indirect impact on

⁶⁹ Interview number 16.

⁷⁰ Interview number 3.

their innovation performance. When it comes to place-specific factors and local resources, technopolis-oriented incentives, reputation, and prestige of the area, qualified human resources, and location and social atmosphere emerged as the significant factors which have an impact on firms' innovation performance. On the other hand, a few interviewees emphasized the significance of place-specific know-how accumulation and substructure in the context of innovation.

4.8.2 Technopolis Incentives

In the SNIS literature, autonomous capability in making expenditures, the role of financial intermediaries, and the policies that promote innovation policies are regarded as vital for high innovation performance (Cooke et al., 1997, p. 476). In the METU Technopolis case, when it comes to financial support and related policies, place-specific incentives provided by the relevant state institutions and their impact on firms' overall innovation performance have been addressed by almost all interviewees.

During the interviews, almost all firm representatives directly emphasized that they benefit from technopolis-oriented incentives, provided to the firms under Technology Development Zones Law numbered 4691. Several firm representatives particularly emphasized that thanks to these incentives they can hire highly qualified employees. These incentives ease firms' operational costs and enable them to have more human resources. Firms in the technopolis mostly benefit from tax allowances and subsidies. Several firm representatives stated that these incentives are vital for

the sustainability of their business. In the interviews, these incentives were highlighted as one of the primary advantages of being in the technopolis.

In the human resources dimension, these incentives are regarded as key support for firms to employ more qualified employees. An interviewee from a defense and aerospace firm mentioned that:

The primary advantage of being in the technopolis is the financial support. Owing to being in the technopolis, due to tax deductions provided to the firms, firms can hire more qualified employees. The financial cost burden of employees over employers is low. For example, if another firm outside of Technopolis would offer me a job with my current salary, their cost would be high. It would be really difficult for them to employ qualified people as the technopolis does.⁷¹

The interviewee also added that as a technopolis firm, they benefit from tax deductions, particularly regarding employers' share of social security premiums. He pointed out that thanks to these pay-roll tax deductions, technopolis firms can offer higher salaries compared to other firms operating outside the technopolis. With this comparative advantage, they attract and retain more qualified employees. In addition to that, he added that since the salaries are paid as net salary rather than the gross salary, it creates motivation for the employees as well. In another interview, similar points were highlighted by another interviewee from an ICT firm as well

The tax deduction is a significant advantage for us. The regulation has changed, but we have a 35% tax advantage. Salaries of engineers are high...Social security premium advantage is a significant advantage. For this reason, in technopoles, the salaries of electronics engineers and software developers are relatively high. Recently, several firms started to carry out projects abroad. But, in technopolis, the reason why we can pay higher wages compared to other firms is that here people's net salary is equal to their gross salary. Owing to this, we can hire more qualified people with good academic backgrounds.⁷²

⁷¹ Interview number 1.

⁷² Interview number 4.

Firm representatives find the tax allowance as a significant competitive advantage for firms to attract highly qualified employees. In the context of innovation, qualified employees are regarded as vital human resources as an innovation input. Hence, these incentives granted by the state are regarded as a critical tool for increasing this area's innovation competitiveness. The interviewee also pointed out that they are supposed to carry out R&D activities in the technopolis due to tax advantage, yet it is not specific to METU Technopolis.⁷³ In this context, for firms, it is indifferent to be in METU Technopolis or any other technopolis. Therefore, there is a significant advantage to running business operations in a technopolis, rather than any other place, concerning operational costs. An interviewee particularly pointed out that having exemptions from certain taxes such as "employee's income tax" and "corporation income tax" are significant incentives for their business and they benefit from these incentives.⁷⁴

Several firm representatives declared that for their financial sustainability, these incentives are essential. Particularly, for small and medium-sized firms, to allocate resources for R&D-related activities, these incentives are vital. For example, an interviewee from a mid-sized firm pointed out that:

We benefit from technopolis incentives. These incentives are critical for our financial sustainability. It is vital. If we would not located in METU Technopolis or if we would benefit from incentives less, I would not perform this job. I would not do anything. Being in the technopolis is vital for us. Being an accredited R&D Center would not even have been working for us. Being in the technopolis is critical.⁷⁵

⁷³ Ibid.

⁷⁴ Interview number 13.

⁷⁵ Interview number 16.

The significance of incentives regarding the financial sustainability of the firms was not only pointed out by a mid-sized firm, but the interviewee of a small-sized I firm also mentioned that:

We utilize state incentives granted for technopolis firms. I think it is a big advantage for us. In order R&D related firms to sustain their business, it is a big advantage. For these reasons, we benefit from all the incentives. Currently, the software industry comes across certain financial disadvantages. Via the incentives, we try to compensate for these disadvantages.⁷⁶

He added that in terms of reducing R&D costs, these incentives provide opportunities for the firms. However, these incentives are not specific to METU Technopolis, but any firm located in a technopolis in Turkey can benefit from similar incentives. The interviewees particularly emphasized that incentives granted by the state are vital for them to carry out their operations and sustain their businesses. The interviewee of an electronics firm also declared that incentives are critical for their financial stability and innovation capability. He pointed out that

Technopolis incentives would have an impact on our innovation performance. One of the biggest goals of being in this area is the incentives. If you do R&D, the cost of R&D is high. The cost of employees is the biggest part of it. Hence, these incentives make us relieved. These incentives support us to sustain our business for a longer period.⁷⁷

To conclude, regardless of firm size and sector differentiation, representatives of all of the firms in our sample underlined the significance of the technopolis-specific incentives. Technopolis incentives are significant for firms to be able to hire more qualified employees and compensate for their operational costs. With the financial support they receive, firms can be able to continue their business and conduct R&D-related activities with more qualified employees. In an innovation environment with an inefficient governance structure in that firms have difficulties funding their R&D

⁷⁶ Interview number 3.

⁷⁷ Interview number 6.

activities, technopolis-specific incentives are critical for firms. In this case, thanks to the macro-level of institutional set-up and the involvement of state institutions, firms in this ecosystem are provided technopolis-specific incentives. These incentives have a high level of positive impact on their R&D and innovation performance.

4.8.3 Reputation and Prestige

In the guideline of the case study conducted in METU Technopolis, the reputation and prestige dimension was not addressed. However, since most of the interviewees highlighted this dimension during the interviews, it has emerged as a sub-theme.

In the case study, eight out of seventeen interviewees directly pointed out that the reputation of METU Technopolis has a positive impact on their firms' performance, including R&D and innovation performance. Particularly the representatives of the ICT cluster within this ecosystem emphasized that METU Technopolis provides a reputation for their business. For instance, the representative of an ICT firm mentioned that, particularly for new start-ups, the reputation of METU Technopolis is significant for the sustainability of their business. He stated that:

The advantage of being in METU Technopolis is that people would like to work with you. Whether you are a no-name firm at the establishment stage, people have a perception that if this firm is from METU Technopolis, it would be a good firm. They prefer you because they think that you have the potential to grow. The biggest advantage of our firm which used to be a start-up firm, is to be positioned in METU Technopolis.⁷⁸

⁷⁸ Interview number 13.

The interviewees mostly mentioned that METU Technopolis has a strong brand. And the reputation of the technopolis has a positive externality impact on their firms' branding as well. However, particularly the ICT firms' representatives mentioned that the prestige and brand value of the technopolis has a positive reflection on their firm. Moreover, the interviewee of a small-sized ICT firm also mentioned that "the biggest benefit of METU Technopolis to their firm is its prestige."⁷⁹ He added that:

If I would have run my business in another technopolis, probably the physical conditions would have been similar. Our academic direction would have been similar as well. But I think the biggest advantage of METU Technopolis is its prestige and dynamism.⁸⁰

While the participants underlined the significance of the reputation and prestige dimension, several participants have even mentioned that the biggest advantage of being in the technopolis is the prestige dimension. For instance, an interviewee from an ICT firm mentioned that "METU Technopolis does not have a big advantage other than prestige and location." He added that:

Being in METU Technopolis is different. To be here means to be close to R&D-related employees which is advantageous. Besides, there is a common perception that in METU Technopolis more R&D projects are carried out.⁸¹

Hence, the interviewee pointed out that due to its brand value on R&D activities, as an ICT firm, it takes advantage of Technopolis' reputation and prestige. It was also stated that though the rent range of the technopolis is relatively higher, the firms still would like to run their operations in this area due to its reputation. The interviewee of a defense & aerospace firm stated that:

There is no incentive for the rent of office spaces. The rent of offices in METU Technopolis is high compared to other technopolis' in the city. Rental places are even limited. There is a high demand, hence people and firms are on the waiting list. If they find a convenient place, they even try to exert several

⁷⁹ Interview number 3.

⁸⁰ Ibid.

⁸¹ Interview number 4.

important people's influence over it to have it. Because it is still regarded as prestigious to be in METU Technopolis.⁸²

He added that they stay in the technopolis due to the prestige dimension. However, if an “unwalled technopolis” project would be carried out and necessary subsidies would be provided, the firm would make a separate firm building to be built.

To conclude, the SI literature suggests that at the sub-national level, with the establishment of a relevant substructure, high innovation performance would be possible. Particularly, in the context of innovation performance “place specific” and “non-economic factors” that create competitive advantage for firms are addressed in the literature (Asheim & Isaksen, 2002, p. 77). Despite that, the prestige and reputation dimension was not addressed either in the literature or in the interview guideline, since it was referred to frequently, this sub-theme has emerged from the field study. Many interviewees emphasized that thanks to the reputation of METU Technopolis, they prefer to run their business in this area. The prestige of the technopolis created added value for their firms as well. Despite that the cost of being in the technopolis is relatively high, they still would like to be operating in this area. Due to the added value of the prestige dimension, their business volume has an increasing trend.

4.8.4 Attracting Qualified Human Resources

In the case study, the impact of the prestige and reputation of METU Technopolis on attracting talent has also been addressed. In many interviews, the

⁸² Interview number 1.

interviewees pointed out that METU Technopolis is a magnet for qualified talents. It is emphasized that due to high brand value and prestige, the candidates choose the firms located in METU Technopolis. For instance, the representative of a mid-sized ICT firm declared that they started their business as a start-up company, and thanks to the brand value of the technopolis, they reached qualified human resources. The interviewee added that “as a start-up company that is founded in METU Technopolis, our biggest advantage is the ability to access qualified employees and reputation.”⁸³

On the other hand, despite that the technopolis attracts talent, in several interviews, it has been underlined that the technopolis does not provide a specific advantage in terms of a talent pool. The technopolis does not own a specific talent pool. An interviewee pointed out that “The technopolis does not provide us a talent pool. We release our job posts on our own. The candidate we reach may have a positive attitude when we say we are a METU Technopolis firm”⁸⁴. The reputation advantage of the technopolis from the candidate’s perspective is highlighted by this interviewee.

In several interviews, it has been emphasized that though the technopolis has a positive reputation for potential employees, due to the brain drain trend experienced in Turkey, it is becoming more difficult to attract talent under the current circumstances. For instance, the representative of a mid-sized ICT firm pointed out that:

In terms of reaching human resources and attracting talent, the technopolis has a positive impact. However, things started to change in the last two years. Currently, it is difficult to find employees. In the previous times,

⁸³ Interview number 13.

⁸⁴ Interview number 14.

when we were setting up the teams, we were able to find the employees who would have perfectly matched our requirements in one or two months.”⁸⁵

This trend is highlighted by another interviewee as well. The representative of a defense and aerospace firm highlighted that due to the current conjuncture of the country, they make much more effort to attract talent. He added that the new applications mostly come anymore from candidates who are not currently employed in the METU Technopolis.⁸⁶

To conclude, even though due to the ongoing brain drain trend, attracting highly qualified talents is becoming more difficult for firms in Turkey, due to its prestige and reputation, METU Technopolis provides advantages for firms to attract highly qualified talents. Attracting qualified candidates has a positive impact on firms' R&D and innovation performance.

4.8.5 Location Advantage and Vibrant Social Atmosphere

In the case study, in addition to the reputation and prestige dimension, the ideal location and social atmosphere of METU Technopolis were also addressed by many interviewees. Thanks to the accessibility to METU Technopolis and the social dynamics it has, highly qualified people mostly prefer to work in METU Technopolis. And the significance of this dimension in the context of innovation was underlined during the interviews. The location advantage and social atmosphere of

⁸⁵ Interview number 7.

⁸⁶ Interview number 1.

METU Technopolis were mostly correlated to talent attraction and employee engagement and well-being.

In two interviews, interviewees emphasized that METU Technopolis is an attraction center for the Z generation. An interviewee from a defense and aerospace firm emphasized that the technopolis is attracting the members of Z generation who are about to enter the workforce. The interviewee added that rather than working in a business center downtown or the periphery neighborhoods of the city where big defense firms are located, the young generation would prefer to work in METU Technopolis due to its location and social environment.⁸⁷ In another interview, the interviewee from an electronics firm pointed out that engineers of the Z generation would like to work in an environment where there are proper social facilities where they would communicate with other people. The interviewee added that young people prefer to work in a location where they can be sociable easily.⁸⁸ Hence, it was emphasized by two firm representatives that for the Z generation being sociable in the workspace is regarded as a key motivation. The interviewee from an electronics firm also pointed out that:

Being in METU Technopolis has a positive impact on our firm's innovation performance....This environment helps people to be sociable. This place helps people to satisfy their social needs as well. Firms outside of the technopolis pay enormous amounts of salaries to retain their talents. This is their one and only competitive advantage. Or they mostly have employees over 40 years old who relatively lose the need of being sociable. The technopolis is not only about technology, but it is a social gathering place. Due to its social advantages people would like to be a part of this environment...The new generation would like to have lunch with people similar to them. The fundamental advantage of technopolis is this social environment.⁸⁹

⁸⁷ Ibid.

⁸⁸ Interview number 17.

⁸⁹ Ibid.

The interviewee defined the technopolis as an attraction center for the young generation in terms of its social structure. The technopolis consists of many start-up firms and due to its proximity to the university, it hosts many young professionals. Hence, by two interviewees this ecosystem is defined as an ideal social place for them. The social proximity in the technopolis and the similarity of employees' identities may create a sense of belonging in this ecosystem as well. Regarding this point, an interviewee of a machinery firm stated:

I think being in METU Technopolis has a positive impact on our innovation performance. If our firm would be located in a place with 80 km of distance to the city center, things would be different for us. When you give a break, you see people around you who speak the same language as you. They talk about similar topics, they work in similar business areas. Hence they talk about the technology trends you would be interested in. Thanks to this, we can communicate with them easily.⁹⁰

The interviewee underlines the significance of social cohesion. According to the interviewee, people sharing similar lifestyles, backgrounds, and mindsets would like to work in the same environment. Hence, in this context, METU Technopolis is regarded as a social place that people enjoy being a part of. The interviewee of a mid-sized firm pointed out that they are running their operations in two distinct technopoles in Ankara. They had aimed to unify the teams under the team in the other technopolis, however, the employees objected to this decision and declared their will to stay in METU Technopolis. He added that:

METU has a unique charm. Campus, environment, coziness, working conditions...Being here is an advantage. We do not intend to leave here. We experienced the benefits of being here a lot. Business cooperations, being on a university campus...This is advantageous for us.⁹¹

⁹⁰ Interview number 13.

⁹¹ Interview number 6.

The sense of belonging and feeling comfortable in the workspace has been emphasized by the interviewees. For instance, an interviewee of a micro-scaled firm declared that thanks to the social environment of METU, people feel a sense of belonging, as members of a family. He added that “I am a METU graduate. Since I feel at home here, due to my social network I would prefer to be here.”⁹² The interviewee stated that being in a cohort sharing a similar background creates a space-related sense of belonging and this has a positive impact on the innovation outcome. During the interview, the interviewee has even given an example regarding this point:

The founders of big global firms...They are all classmates, they all studied together. They are the outcome of the same ecosystem. Each of them influences the other one. For this reason, they became pioneers in their areas.⁹³

Employee satisfaction regarding the sense of belonging was mentioned in other interviews as well. The owner of a micro-scaled firm declared that both he and his employees love the technopolis as a social place. Hence, they prefer to operate their business in this area.⁹⁴

The location of METU Technopolis is regarded as an advantage to attract talent from universities located around this area. In addition to that it is regarded as an advantage to attract talents due to its accessibility. An interviewee from an ICT firm pointed out that “Our location is good. That’s why people can come here easily. The transportation is easy.”⁹⁵ Hence, the location of METU Technopolis is mostly regarded as a place that has a significant advantage to attract and retain talent.

⁹² Interview number 17.

⁹³ Ibid.

⁹⁴ Interview number 14.

⁹⁵ Interview number 7.

To conclude, both the location advantage and social environment in METU Technopolis are regarded as significant strengths for attracting and retaining talents. In addition to that interviewees added that these advantages make people who work in this area more engaged and content. In the context of innovation, it is mostly mentioned that, as an input, talent is an asset. Hence, attracting qualified employees, carrying out R&D-related activities, and producing innovation are regarded as possible.

4.8.6 Non-Inclusionary Infrastructure Support

In the SI literature, the supportive infrastructure at the sub-national level is regarded as significant in the context of the production of innovation (Asheim & Coenen, 2005, p. 1177). Hence, the literature assumes that sub-national factors regarding infrastructure have an impact on innovation. In the case study, regarding innovation outcome, the infrastructure dimension has emerged as an improvement point.

In the case study, most of the interviewees (11 out of 17 firm representatives) declared that the technopolis does not provide a specific infrastructure for firms that would increase their innovation performance. Most of the firm representatives pointed out that for product development, testing, or analysis activities they do not utilize the technopolis infrastructure. An interviewee from a machinery firm stated that they have another office in another neighborhood to carry out the testing

activities and as a hardware-related firm, they do not utilize any specific facility of the technopolis. He added that:

In terms of the infrastructure... We are not software related but a hardware-related firm. Since we produce machines operating on the field, we did not utilize the technopolis structure. By nature, the technopolis is mostly serving software-oriented firms. Since all the structure is based on this fact, we cannot utilize the substructure. As a hardware-based firm, since we need a test space, we have two separate offices. And our other office is located outside of the technopolis.⁹⁶

The representative of an environment firm also emphasized that technopolis is mostly configured for software-related firms. However, the interviewee added that the technopolis provides infrastructure at a certain point, however, it does not serve them. The interviewee mentioned that “there is a space called Design School in the technopolis which includes certain machines such as CNC machine and 3D printer. It would probably serve firms in the technopolis. However, we do not utilize it.”⁹⁷ On the other hand, in certain interviews, the scale problem was addressed. The interviewees pointed out that the infrastructure of the technopolis is mostly utilized by start-up firms. Thus, it was emphasized that the infrastructure of the technopolis is mostly serving micro-scale ventures and start-up firms.

When it came to the point of whether they benefit from the laboratory or testing infrastructure of the university located on the same campus, only a few interviewees declared that they utilize it. For instance, an interviewee of an ICT firm declared that the technopolis provides access to laboratories of the university which may be considered as an advantage. The interviewee added that thanks to be a part of

⁹⁶ Interview number 10.

⁹⁷ Interview number 11.

the technopolis ecosystem, they have been working in university departments and central laboratories.⁹⁸

To conclude, in the case study, most of the participants declared that the infrastructure of the technopolis does not support their innovation performance meaningfully. Particularly, the representatives from machinery firms that need infrastructure to carry out their activities stated that they utilize their solutions. Interviewees mostly concluded that the infrastructure of the technopolis was designed mostly for ICT firms and start-ups. For these reasons, the infrastructure of the technopolis does not have a meaningful impact on firms' competitiveness and innovation performance. And infrastructure dimension is regarded as an improvement area for the technopolis.

4.8.7 Firm-Level Know-How Accumulation

In the SI literature, innovation systems are regarded as the centers of “collective learning and innovation” (Muscio, 2006). “Local learning processes” and “sticky knowledge embedded in social interaction” are considered the significant factors which have an impact on the innovation performance in an innovation system (Maskell, 2001; Maskell et al. 1998; Muscio, 2006, p. 774).

In the case study, six interviewees directly declared that the technopolis does not have technopolis-specific know-how. However, several interviewees also stated that the firms in the technopolis have individual know-how in their operational areas.

⁹⁸ Interview number 16.

Particularly, ICT firms' representatives pointed out that ICT firms have their know-how. For instance, the representative of an ICT firm stated that "When it comes to technical know-how, the technopolis has a partial advantage. But this know-how does not belong to the technopolis, but the technopolis firms."⁹⁹ Similar to the previous view, the representative of another ICT firm stated that "The technopolis does not have a software specific know-how, however, firms have their know-how. But this know-how is not shared."¹⁰⁰ In addition to the small-scale firms, the interviewee of a mid-sized ICT firm also stated that "the technopolis does not have a technopolis-specific know-how. Thus, it does not have an area-based competitive advantage."¹⁰¹

These views are not specific to ICT firms, in another business field, machinery, the interviewee of a machinery firm stated that "There is no know-how accumulation, particularly at the technopolis level. Firms own their know-how."¹⁰² In contrast of that, one representative of a small-sized ICT firm pointed out that in the technopolis there is a high level of know-how accumulation, however particularly for the ICT side, it does not have particular know-how such as know-how on mobile, hardware, and software areas. The interviewee added that to have a competitive advantage, the technopolis should have a specific, focused know-how accumulation.¹⁰³

⁹⁹ Interview number 3.

¹⁰⁰ Interview number 14.

¹⁰¹ Interview number 16.

¹⁰² Interview number 10.

¹⁰³ Interview number 15.

When it comes to knowledge sharing in this ecosystem, the interviewees pointed out that rather than organized, process-based, or structured ways, in the technopolis knowledge is shared through the informal ways of communication. For instance, an interviewee of an ICT firm stated that:

In this ecosystem, there are firms with similar know-how. Our employees start to work for other firms in this ecosystem. Thanks to this, know-how is transferred among the firms. Direct cooperation or interaction is not common. In our sector, people do not hesitate to share knowledge. They tell whatever they know. During lunch breaks or when we talk to firm owners or our colleagues we tell about our secret sources. The mobile area is open for discussions and sharing.¹⁰⁴

Besides, the representative of a small-sized ICT firm also declared that:

Knowledge sharing makes your firm dynamic and helps you to draw a company strategy. As you see people's actions, witness their experience, or their route in the market, you decide how fast you should make decisions accordingly. This is similar everywhere. It may not be defined precisely, however, being a part of this technopolis ecosystem allows experienced and learned data to be transferred to you in a fast way. The biggest contribution of technopolis is this knowledge diffusion.¹⁰⁵

To conclude, the interviewees mostly declared that in the METU Technopolis firms own their know-how. Therefore, in the technopolis firm-level know-how is observed, rather than the area-specific know-how. Knowledge is mostly shared through informal, non-structured ways through informal communication channels. Sharing tacit knowledge through non-structural ways is common. Hence, there is a certain level of knowledge diffusion as well. Hence, as it is addressed in the SI literature, “sticky knowledge embedded in social interaction” is observed in the technopolis (Maskell, 2001; Maskell et al. 1998; Muscio, 2006, p. 774).

¹⁰⁴ Interview number 13.

¹⁰⁵ Interview number 10.

4.8.8 Conclusion for Impact of Place-Specific Factors and Local Resources

The VoC literature suggests that in a market economy, high innovation performance would be possible under the circumstances that there are strong institutional complementarities and macro-level coordination. On the contrary, in the SI literature, independent of these factors, high innovation performance would be regarded as possible thanks to place-specific factors and local resources.

In the case study, conducted in the METU Technopolis, many firm representatives stated that being in the technopolis has a positive impact on their innovation performance. Most of the interviewees from the firms operating in different areas such as ICT, environment, machinery, and electronics declared that since they are operating in METU Technopolis, for various reasons their innovation performance is higher.

In METU Technopolis, place-specific factors and local resources have a big impact on technopolis firms' innovation performance. Interviewees mostly stated that thanks to technopolis-related incentives and access to highly qualified human resources due to the reputation and prestige of the technopolis and the location of the technopolis and its social atmosphere, their innovation performance is higher. On the other hand, in contrast to the literature's suggestions, the infrastructure support and area-specific know-how accumulation were not addressed as significant factors that have an impact on their innovation performance.

4.9 Interdependence & Non-Linearity and Interaction

The SI literature regards innovation as the outcome of various stakeholders' interactions. This approach addresses the "systemic interactions between the various components of inventions, research, technical change, learning, and innovation" (Soete et al., 2009, p. 7). In addition to that, the interaction between "a set of actors such as firms, other organizations, institutions that interact in the generation, diffusion....and production process" is studied in the SI literature (Fischer, 2001). In the context of innovation, the significance of "interdependence and non-linearity" is emphasized in the SI literature (Edquist, 2006). Hence, in this approach innovation is not addressed regarding the "elements of the system" but, "the relations between these" are also addressed (Edquist, 1997).

In the case study of METU Technopolis, regarding the interdependence, non-linearity, and interaction theme, several sub-themes such as "agglomeration's positive impact on interaction," "limited effectivity of clustering" and "high level of interaction among other technopolis firms" have emerged.

4.9.1 Agglomeration's Positive Impact on Interaction

Agglomeration provides an advantage for firms to collaborate easily. Due to the accessibility, co-located firms can execute mutual R&D processes, share their know-how and develop products together accordingly. The case study showed that technopolis firms take advantage of being located in the same technopolis to interact with other firms.

Most of the interviewees (12 out of 17 representatives) pointed out that thanks to agglomeration in the technopolis, they interact with other firms. The firm representatives emphasized that this interaction is based on various relationships such as networking, sub-contracting, outsourcing, talent attraction, conducting mutual R&D projects, and brainstorming. In addition to that, during the interviews, several firm representatives emphasized that agglomeration makes communication and interaction easier, and thanks to physical proximity, they interact intensely.

Interviewees from five ICT firms stated that thanks to agglomeration in the technopolis, they are interacting with the neighbor firms. An interviewee from a large-scale firm declared that they cooperate with other firms located in the same area. This relationship is more of a sub-contracting relationship. However, the interviewee added that when it comes to being solution partners, though they are making efforts, it does not yield concrete results.¹⁰⁶ On the other hand, the representative of a mid-sized firm declared that the agglomeration creates a talent attraction-based advantage. He pointed out that

We have just hired two employees. These employees were relocated from one floor of the office building to another one. Being in the same location creates an advantage in terms of attracting talent.¹⁰⁷

Hence, this explanation shows that thanks to proximity, there is labor mobility across firms located in the technopolis. The physical proximity creates an advantage for reaching the talents easily. Besides, through labor mobility, know-how is transferred from one firm to another.

¹⁰⁶ Interview number 8.

¹⁰⁷ Interview number 7.

The co-location triggers the interaction among the firms located in the same area. An interviewee from an ICT firm pointed out that agglomeration creates synergy. The interviewee added that:

The *raison d'être* of technopolis is the synergy. We conduct projects together. We make so much effort on it. We established a digital transformation platform. We discuss innovation-related issues there. We are eager to do business with neighboring firms. This has a positive influence on the innovation outcome.¹⁰⁸

As the interviewee pointed out, the proximity of firms operating in the same business area is expected to create a synergy that would end up in an innovative outcome.

Three representatives of firms operating in the electronics area stated that agglomeration is a significant factor for them to interact with other firms. An interviewee from a mid-sized electronics firm addressed the synergy effect. He emphasized that:

There is a high level of synergy in the technopolis. Employees are classmates from the university. They know each other. Agglomeration contributes to production together. Being close to each other is advantageous when it comes to conducting a mutual R&D project. Engineers from other firms come to our office easily. Communication is easier when you are on the same campus.¹⁰⁹

In several interviews, interviewees referred to the synergy effect of agglomeration.

Hence, sharing the same space is regarded as significant to communicate more effectively and easily. In addition to that being close to firms with separate specialization areas would enable cross-disciplinary projects to be carried out easily. The representative of an electronics firm stated that they know the competencies of firms around them. Hence, to run a cross-functional project, they receive support from these firms.¹¹⁰

¹⁰⁸ Interview number 9.

¹⁰⁹ Interview number 5.

¹¹⁰ Ibid.

In two interviews, the participants pointed out that though technopolis makes it easy to interact with other firms, due to agglomeration, firms may tend to carry out their activities individually. The environment firm's representative stated that being around leading firms in their business area is a big advantage for them and they worked together on certain projects. However, the interviewee added that agglomeration does not facilitate communication on its own since firms mostly prefer to run their activities on their own. The interviewee mentioned that:

I never knocked on the door of firms around us all of a sudden. Our communication is not location-driven. When demand meets supply and they look for firms to cooperate, they find us. However, when they notice that we are physically close to each other, it makes things expedited.¹¹¹

The same point is highlighted by another interviewee as well. The interviewee highlighted that firms mostly conduct their activities individually. The interviewee mentioned that:

We interact with other firms and it works for us. However, when the doors are closed, the firms are on their own. If firms have a sister company or subsidiaries they mostly operate together. If not, firms individually run their business.¹¹²

The tendency to run the business individually may be caused by the competition as well. It may be a problem, particularly for small businesses. The representative of a small-scaled firm stated that they put effort to cooperate with other firms to do mutual R&D and develop products. The interviewee emphasized that firms mostly refrain from strengthening their competitors through mutual R&D. Hence they withdraw into a lonely shell despite the loss of a potential gain. However, the

¹¹¹ Interview number 11.

¹¹² Interview number 12.

interviewee added that being in the technopolis is a good opportunity to open a new path for interaction. Agglomeration makes it easier to collaborate.¹¹³

Several interviewees put forward improvement areas for collaboration of firms that are co-located. For example, the representative of an ICT firm pointed out that in the technopolis, shared space and communal areas are limited.¹¹⁴ Hence, though the firms are agglomerated, there is a limited area for them to physically meet. It was also added that there is no sufficient guidance to know more about other firms' competencies.

Another interviewee from a small-scale firm also highlighted that collaboration culture is weak in the ecosystem. It was added that though many firms around them would potentially do business together, due to a lack of strong collaboration culture, they run their operations mostly on their own. It was emphasized that they interact with other firms. However, this interaction is not based on agglomeration or location proximity but on acquaintance.¹¹⁵

To conclude, in the case study, most of the interviewees declared that due to agglomeration in the technopolis, they interact with other technopolis firms. Thanks to the co-location, this interaction is based on various relationships such as networking, sub-contracting, outsourcing, talent attraction, conducting mutual R&D projects, and brainstorming. Besides, the synergy effect of agglomeration was also addressed by the interviewees. Agglomeration has a positive impact on firms' innovation performance.

¹¹³ Interview number 9.

¹¹⁴ Interview number 7.

¹¹⁵ Interview number 3.

4.9.2 Limited Effectivity of Clustering

In METU Technopolis, there are three clusters which are “Technopolis Defense Industry Cluster,” “Technopolis IT and Telecommunications Cluster” and “Technopolis Advanced Health Technologies Cluster.” During the interviews, most of the interviewees (11 out of 17 interviewees) addressed the cluster structure in METU Technopolis.

Six interviewees declared that the cluster structure of the technopolis does not have a direct positive impact on their innovation performance. The interviewee from the defense and aerospace firm stated that “When it comes to clustering...I do not think that it has an impact on our innovation performance. Firms do not even know what the other firms are doing.”¹¹⁶ The interviewee pointed out that the cluster structure does not help firms to align and act accordingly. On the other hand, an interviewee from an electronics firm declared that they have already been interacting with other stakeholders and the cluster only made it official.¹¹⁷ Hence, if the cluster would not have been formed, nothing would have changed in their business relations and interaction. He added that:

Clustering does not have an additional impact on our innovation performance. Before it became formal, we were already in contact with the people in the cluster. We were friends. I think converting things into a more formal one is not effective. The previous strategy of the technopolis was conducting events. During coffee breaks, we were sharing a lot. Rather than formal cluster meetings, these social gatherings were more effective to share. Now, working groups are formed. It does not matter, but it does not yield concrete results. We have already been friends.¹¹⁸

¹¹⁶ Interview number 1.

¹¹⁷ Interview number 17.

¹¹⁸ Ibid.

The firm representative declared that unstructured way of communicating and knowledge sharing may be more effective compared to formal structure and discussions. In addition to that an interviewee from a small scaled firm stated that since they are operating in a niche business area, the cluster does not contribute to their innovation performance.¹¹⁹ The clustering structure is mostly serving for businesses operating in conventional areas.

In the case study, five firms' representatives emphasized that they find cluster structure effective. For instance, a representative of a mid-sized ICT firm pointed out that:

In the technopolis, there is a cluster named Technopolis Defense Industry. This cluster organizes exhibitions that allow firms to know more about each other. Thanks to these exhibitions you reach the clients. At that point, acting together is an advantage.¹²⁰

The representative of a mid-sized electronics firm also stated that the cluster structure increases the level of interaction for firms and this interaction leads to business opportunities. The interviewee pointed out that:

I think the agglomeration of firms operating in the same business is significant. We also benefited from being a member of a cluster. For instance, we do business in the defense industry. Thanks to the cluster, after a while people begin to get to know more about each other. And when they have a business opportunity, they remember your firm. They at least ask for a business proposal. It leads to new business opportunities.¹²¹

As the quotations above demonstrate, several firm representatives find the cluster structure efficient in the context of its impact on their businesses. Clusters' impact on the alignment of firms, networking, and business opportunities was emphasized by the interviewees. An interviewee from an electronics firm pointed out

¹¹⁹ Interview number 14.

¹²⁰ Interview number 4.

¹²¹ Interview number 5.

that the cluster structure creates “synergy.”¹²² The interviewee added that “Thanks to this synergy, we benefited from the cluster structure both at the management and engineering levels.” Another interviewee from an ICT firm underlined the significance of this synergy among the employees. The interviewee pointed out that the cluster structure supports networking among employees. However, this synergy did not turn into a concrete product. The interviewee pointed out that:

The clustering has an advantage for the employees. Employees gather in common places and events and they share ideas. Firm employees find the opportunity to be in the technopolis events, hence they transfer their ideas...Thanks to the cluster events employees do networking. But I do not think that it turns into a concrete product.¹²³

The firm representatives who declared that they do not find the cluster structure effective when it comes to firms’ innovation performance also stated several advantages of the cluster structure. For instance, an interviewee from an environment firm pointed out that they attend the events of the cluster, particularly exhibitions.¹²⁴ The interviewee added that these exhibitions enable firms to interact with big sector players and make firms interact with all the stakeholders. According to this firm representative, the biggest advantage of being in a cluster is the marketing and promotion support provided through cluster events.

To conclude, many interviewees addressed the cluster structure of METU Technopolis during the interviews. Despite that several advantages of clusters such as exhibitions, networking, and business opportunities were emphasized by the interviewees, in terms of a high level of innovation performance, cluster structure was not considered effective.

¹²² Interview number 6.

¹²³ Interview number 15.

¹²⁴ Interview number 11.

4.9.3 High Level of Interaction Among Other Technopolis Firms

The SI literature suggests that the agglomeration of firms in an innovation system would lead to a high level of interaction. Most of the interviewees (12 out of 17 firm representatives) declared that they interact with other technopolis firms in the context of innovation. This interaction is performed through various ways such as sub-contracting, conducting mutual R&D projects, mutual product development, or know-how and technology transfer.

On the other hand, four out of five firms that do not interact with other technopolis firms are ICT firms. Interviewees of two of these firms declared that though they made an effort to interact with other firms of the technopolis, the attempt did not yield a concrete result. For instance, the representative of a mid-sized ICT firm expressed that they made an effort to co-develop a product with another technopolis firm and they even tried to incentivize the project through TUBITAK funds. However, it could not be sustainable.¹²⁵ In another interview, the representative of a small-sized ICT firm also declared that though they conducted feasibility studies to cooperate with other technopolis firms, it did not turn into a concrete project.¹²⁶ Besides, an interviewee of another mid-sized ICT firm pointed out that they do not interact with other firms due to the maturity level they have reached. The interviewee added that:

We do not prefer to interact with other firms. We have come to this point through our competencies. We have a lot of employees. Our export performance is high. At this point, we do not need collaboration. Because firms slow down each other. It is difficult to develop a product in the same direction as another firm.¹²⁷

¹²⁵ Interview number 7.

¹²⁶ Interview number 9.

¹²⁷ Interview number 13.

The interviewee from this ICT firm emphasized that collaboration may be a disadvantage for firms that would like to achieve improvement in a faster way. Compared to electronics and machinery firms, ICT firms tend to carry out activities on their own. Other five ICT firms' representatives declared that they interact with other technopolis firms through various activities such as subcontracting and mutual product development.

During the interviews with ICT firms, several representatives pointed out that they carry out innovation-related activities with big firms and they serve them as sub-contractors. Particularly, leading state-owned defense firms' names were voiced in the interviews. Besides, TUBITAK-funded projects were emphasized as projects which are expected to yield innovation-related outcomes. In this context, state-owned firms' role in the ecosystem is observed.

In terms of product development, several ICT firms' representatives stated that they do product development with other technopolis firms. The representative of a small-sized ICT firm¹²⁸ emphasized that thanks to be a part of the technopolis ecosystem, they meet many other people from other technopolis firms in the meetings conducted by the technopolis. Hence, being in this ecosystem provides them with a network advantage that would turn into concrete cooperation and mutual product development. In addition to that, the interviewee added that through mutual product development, they transferred the know-how. On the other hand, these mutual product development activities can lead new firms to emerge. For instance, the representative of an ICT firm stated that as a result of the mutual R&D project,

¹²⁸ Interview number 3.

the project turned into a spin-off company and they keep performing R&D activities with this new technopolis firm.¹²⁹ In addition to that another interviewee from a mid-sized ICT firm pointed out that they interact with other technopolis firms to consult about their distinct competencies.¹³⁰ And the location advantage makes it easier to collaborate with other firms with distinct competencies. The interviewee added that:

We work with firms having different competencies and specializations we do not own. They are providing complementary technologies to us. As a software firm, I have access to a robotics or mechatronics firm here in the technopolis. Maybe we would have been still working with each other if they would not have been technopolis firms. However, being close to each other in a technopolis makes it facilitated.¹³¹

Two out of three electronic firms' representatives declared that they interact with other firms. In the interviews conducted with the electronics firms, it has been stated that the interaction with other technopolis firms is based on cross-disciplinary work. An interviewee from an electronics firm stated that "each firm has a reputation in a specific field, in a project we come together, and each firm contributes to the project with their competencies."¹³² The interviewee pointed out that this cross-disciplinary work can result in a mutual product. The synergy among technopolis firms enables know-how to be transferred to other firms as well. This view was provided in another interview as well. The interviewee from another mid-sized electronics firm also pointed out that when they need expertise in an area in that they do not have the competency, they interact with other technopolis firms. And due to cultural and local proximity advantages, they prefer primarily to work with the technopolis firms.¹³³

The interviewee added that:

¹²⁹ Interview number 15.

¹³⁰ Interview number 16.

¹³¹ Ibid.

¹³² Interview number 5.

¹³³ Interview number 6.

When we have a competency gap and need support, we work with other technopolis firms. The software area can be given as an example. The reason why we choose technopolis firms is based on the easy communication, distance advantage and sharing the similar work culture.¹³⁴

Besides, this interaction does not have to be formed in a structured or formal way. It usually takes place in a non-structured way. At this point, an interviewee from an electronics firm mentioned:

The technopolis has sub-ecosystems such as defense, biomedical, and gaming. In these ecosystems, people know and trust each other. We do not share technical know-how. However, we cannot control it. Our employees share the knowledge in their social environment. That is the invisible part... Your employee can intervene in other people's conversations during a break when they are smoking outside. The biggest advantage of the technopolis is this non-structured knowledge sharing and interaction. Because the employees of different firms are friends.¹³⁵

It was emphasized that the product development process is carried out informally as well. Since the employees communicate with other people from other firms regularly, mutual product development is carried out naturally. The interviewee pointed out that since this process is not running officially, it ends up in an innovative and creative product which may be considered an advantage of the technopolis.

In other firms operating in areas outside of ICT or electronics, interaction among various firms is reinforced as well. For instance, an interviewee from the environment firm pointed out that the agglomeration of firms operating in different fields enables them to cooperate. Hence, cross-disciplinary work is possible in the technopolis due to the interaction of firms operating in distinct business areas.¹³⁶

¹³⁴ Ibid.

¹³⁵ Interview number 17.

¹³⁶ Interview number 11.

To conclude, thanks to the agglomeration of technopolis firms, a high level of interaction among them is achieved. Most of the firm representatives declared that, thanks to be co-located with other technopolis firms they interact with each other. When it comes to the interaction, various ways such as sub-contracting, conducting mutual R&D projects, mutual product development, or know-how and technology transfer are preferred. This interaction enables firms to do cross-disciplinary work, develop mutual products, and transfer core competencies out of their expertise area. Thanks to the synergy created in this area and due to the collaboration with other technopolis firms, firms even launch new business models and establish spin-off companies.

4.9.4 Conclusion for Interdependence & Non-Linearity and Interaction

SI literature considers innovation as the outcome of the interaction of various stakeholders. As Edquist (1997) emphasizes, in this approach “elements of the system” are not addressed, but “the relations between these” are addressed.

In the METU Technopolis, regarding the interdependence, non-linearity, and interaction theme, several sub-themes which are “agglomeration’s positive impact on interaction,” “limited effectivity of clustering” and “high level of interaction among other technopolis firms” have emerged.

In the case study, it is found that thanks to agglomeration, technopolis firms interact with each other. From networking to sub-contracting, outsourcing to talent attraction, and mutual R&D activities, firms interact on a large spectrum. There is a

high level of interaction among technopolis firms. Due to this interaction, firms do cross-disciplinary work, develop mutual products, and transfer core competencies.

On the other hand, despite that the cluster structure was expected to be working for the benefit of innovation outcome, in the context of innovation performance, limited effectivity of the cluster structure is observed. However, the cluster structure has a positive impact on firms for various reasons such as exhibitions, networking, and business opportunities.

4.10 Close Cooperation with the University

In the SI literature, the supportive institutional structure at the sub-national level and knowledge generation organizations such as universities, colleges, research laboratories, technology transfer agencies, or vocational training institutions are regarded as complementary to high innovation performance (Asheim & Coenen, 2005, p. 1177). Furthermore, in a sub-national system with a “rich innovation structure, ranging from specialist research institutes to universities, colleges, and technology transfer agencies,” it is expected the firms in this ecosystem to reach and apply the knowledge created in this system (Cooke, 2002, p. 136).

In the case study, most of the interviewees (15 out of 17 firms’ representatives) declared that they interact with the university (Middle East Technical University) located around the technopolis in the context of the production of innovation. This interaction is based on various activities such as receiving academic advice, utilization of the university’s substructure, conducting mutual R&D

and even forming a mutual work group. Firms operating in various industries of various sizes have an innovation-related relationship with the university. Hence, the interviews demonstrated that there is strong university-industry cooperation between the firms and the university.

4.10.1 Academic Advisory

Firms in the technopolis ecosystem may prefer to receive academic advice from academicians to carry out R&D activities. In the case study, most of the interviewees pointed out that they have access to university professors when they need academic guidance for their business. For instance, the interviewee from the defense and aerospace firm stated that the technopolis mediates for academic advisory when they need it and in an R&D project, they worked with a professor from the university.¹³⁷ Many of the interviewees referred to the academic advisory they received during the R&D projects. From the interviews, it appears that firms do not come across critical complications when it comes to reaching the technical know-how of the university. Thanks to the location and mediatory role of the technopolis, they can reach academic knowledge accumulation. For instance, the representative of the environment firm pointed out that:

We cooperate with the university. We purchase consultancy services from the university. It starts with finding a professor who produces the knowledge you need. There are two ways of communication. The first one is direct communication, and the second one is communication via Technology Transfer Office (TTO)... You may find a professor on your own, or TTO may search for a professor for you.¹³⁸

¹³⁷ Interview number 1.

¹³⁸ Interview number 11.

The statement of the interviewee shows that the university located around the technopolis supports the firms via its micro institutions such as TTO. It enables firms to have access to the right academic staff they need for their R&D projects.

However, it has been observed that in most of the firms, academic advisory could not be sustained in the subsequent projects though it was experienced before. In certain interviews, particularly with the ICT firms, it was pointed out that the transfer of know-how from the university does not always yield concrete results or outcomes such as a product or service. And theory may not be applied as it is aimed though firms keep receiving academic advisory. For instance, an interviewee from an ICT firm stated that:

The academic staff of the universities is distant to commercial products, they do fundamental R&D. As firms, we need commercial R&D. For this reason we could not convert an academic project into a commercial project. However, recently we observe that several firms achieve this.¹³⁹

In another interview conducted with another ICT firm, the interviewee stated that university-industry cooperation cannot be realized as it is idealized.¹⁴⁰ The interviewee added that:

The university is not ready for the industry. As the firms, we are not performing academic projects. I think that synergy [between universities and firms] cannot be created. There are technopolis firms owned by academicians. They may interact with the university much more. However, I worked with many firms. I did not even witness a synergy in these cases as well.¹⁴¹

The quotations from the interviews given above demonstrate that despite that many technopolis firms are interacting with the university in the context of innovation when it comes to focusing on commercial innovation, transferring theoretical

¹³⁹ Interview number 3.

¹⁴⁰ Interview number 4.

¹⁴¹ Ibid.

knowledge from the university would not be sufficient to develop successful products. In several other interviews, it was also declared that the academic advisory could not help firms to develop final commercial products. Hence, when it comes to converting theoretical knowledge into a real successful product, firms come across challenges. Thus, the commercialization of R&D projects' outputs was raised as a significant problem. For example, the interviewee of the environment firm pointed out that "in terms of innovation, in terms of the development of a product, the impact of the academic advisory is around 15%."¹⁴² Besides, another interview from an electronics firm stated that academicians are mostly interested in the publication side of the projects and they have a high-level theoretical perspective. The interviewee added that in Turkey the business needs the application, not the theory.¹⁴³

Despite the critiques regarding the conversion of theoretical knowledge into successful commercial products, in certain other interviews participants pointed out that thanks academic advisory they receive, their innovation performance is higher.

For instance, the interviewee of a big scaled ICT firm stated:

METU has a positive impact on our innovation performance. We are interacting with other universities as well. We expanded this interaction. It is not limited to academic advisory. We established a work group for a project we carry out in our R&D department... In this working group, there are representatives from various universities. It is a good cooperation and it enables know-how transfer as well. We do the development. Academicians turn this development into academic publications.¹⁴⁴

In addition to that, the interviewee also pointed out that being in the technopolis, the location of the firm provides an advantage to facilitate the interaction with METU.

The interviewee added that academicians also prefer to work with the technopolis

¹⁴² Interview number 11.

¹⁴³ Interview number 17.

¹⁴⁴ Interview number 8.

firms and the contract process of the technopolis is standardized. Hence, it is easy to facilitate the contracting process for firms.¹⁴⁵

In another business field, on the electronics side, an interviewee pointed out that in a business or R&D-related process when they ran into difficulty, they consulted the guidance of university professors.¹⁴⁶ This view was also voiced by the interviewee from another ICT firm. The interviewee stated that the cooperation with the university has a positive impact on their innovation performance and they are receiving academic advice from professors of METU. The interviewee added that “professors have a different perspective and they present different ideas to the attention of the firm.”¹⁴⁷ During the interview, it was also highlighted that the firm was led to relevant research by academicians. Thanks to this guidance, they improve the performance of their software.

During the interviews, the interviewees pointed out that this advisory process does not have to be designed as a structural process. Since they have been interacting with the university staff frequently, they may benefit from their academic know-how through non-structured ways.

To conclude, in the case study, most of the interviewees declared that they have access to university professors when they need academic guidance. The university provides support via its micro-institutions such as TTO. In addition to that, firms mostly collaborate with academicians in their R&D projects. Interviewees declared that when they run into difficulty, they receive academic guidance. To have

¹⁴⁵ Ibid.

¹⁴⁶ Interview number 5.

¹⁴⁷ Interview number 13.

a different perspective on their projects, they prefer to work with academicians. However, the commercialization of R&D projects' outcomes was raised as a significant problem. Theoretical knowledge could not usually be converted into successful commercial products in the end. It was addressed as an improvement area.

4.10.2 Cooperation via University Alumni

METU Technopolis is an innovation system where METU graduates are working in various roles such as firm owner, entrepreneur, or employee. In the case study, several interviewees emphasized the significance of the organic ties of their employees with METU. In these interviews, it is emphasized that firms employ many METU graduates and thanks to employees who pursue their academic work at METU, they actively connect with the university's know-how. It was also stated that employees perform their academic studies regarding their professional area to support their business as well. For instance, an interviewee from a healthcare firm emphasized that an employee in the firm wrote a master's thesis regarding their firm's operational area. Hence, this experience helped the employee to specialize in the defined area, and in the end, thanks to this experience they gained a reputation.¹⁴⁸

The interviewee emphasized that:

One of our employees wrote a master's thesis in METU. The thesis was about a device we are producing. His academic advisor guided him. Thanks to this study, both the advisor and our firm gained a reputation. On the other hand, this study supported us in the technologies we will adapt to our products in the future.¹⁴⁹

¹⁴⁸ Interview number 2.

¹⁴⁹ Ibid.

This case is an example of university-industry cooperation. Since employees are encouraged to study a real firm case, the know-how of the university is transferred to the firm via academic studies. In another interview conducted with the interviewee from an electronics firm, the interviewee also highlighted similar cooperation.¹⁵⁰ The interviewee stated that:

We received guidance from university professors for our employee's post-graduate studies and their academic areas. Our employees mostly select an area that corresponds to our firm's operational area. In this case, these academic works have a positive impact on our operational work as well. They take post-graduate level courses. Thanks to their supervisors' guidance, they transfer accumulated knowledge which has a positive impact on our R&D projects.¹⁵¹

He added that one of his employees' academic studies turned into a concrete output, as a part of their firm's product portfolio.

In another interview conducted with a small-sized machinery firm, the interviewee pointed out that thanks to their academic background, they maintain relationships with the university. As alumni members, they sustain their affiliation with the university. The interviewee added that:

As a team, we are METU graduates, we have academic backgrounds from METU. Thanks to this, we maintain our relationships with the university. Being located in the technopolis makes it even easier. We overcome the procedures in a fast way. On the other hand, for firms that do not have an acquaintanceship with the university, the technopolis facilitates them to connect with the university.¹⁵²

This statement demonstrates that thanks to the ecosystem of METU which is located nearby the university, there are organic ties between the university and the technopolis employees. Many METU graduates start to work for technopolis firms and they start their own business in this area as well. These organic ties enable them

¹⁵⁰ Interview number 6.

¹⁵¹ Ibid.

¹⁵² Interview number 10.

to establish business networks. Thanks to these relationships, they contribute to their business as well.

To conclude, METU Technopolis is an innovation ecosystem where many METU graduates are employed or firm owners. Thanks to organic ties between the university and the technopolis, there is close cooperation between the university and technopolis. Many employees in the technopolis study in post-graduate programs of METU and they study in specific areas in which the firms that they work for establish competencies.

4.10.3 Conclusion for Close Cooperation with the University

In the case study, most of the interviewees mentioned that they actively interact with METU. In their R&D projects and innovation-related activities, firms mostly collaborate with academicians in their R&D projects. When they come across a problem, they consult academicians. However, when it comes to commercializing R&D project outputs, they have improvement points. Theoretical knowledge could not usually be converted into commercial products easily.

Besides, in METU Technopolis many METU graduates are employed or firm owners. Due to the organic ties between the university and the technopolis, there is a high level of coordination between firms and the university.

4.11 Discussion and Conclusion for the Case Study

In this chapter, the empirical findings generated from the case study, conducted in METU Technopolis are covered. In this case study, nine variables generated from two literatures, VoC and SI were addressed. The variables derived from the VoC approach are “macro-level institutional complementarities,” “inter-firm relations,” “vocational training and education system,” “corporate governance,” “employees” and “industrial relations.” On the other hand, the variables derived from the SI approach are “place-specific factors and specific local resources,” “interdependence & non-linearity and interaction” and “generation, use, and dissemination of knowledge.”

In the METU Technopolis case study, seventeen in-depth interviews were conducted with firms operating in various business areas which are defense and aerospace, ICT, electronics, machinery, environment, and healthcare. As a result of the analysis of the case study, nine themes regarding each variable emerged.

This study is conducted to understand “How can innovation be possible in an MME?” and “Under which conditions can innovation be possible in an MME?” In the case study, the assumptions of two literatures, VoC and SI were tested.

In the VoC approach, in contrast to ideal-typical market economies which are LMEs and CMEs, MMEs are regarded as disadvantageous to have high innovation performance due to a lack of institutional complementarities and macro-level coordination. Hence, the literature does not expect MMEs to have high innovation performance due to their institutional set-up. However, the case study findings

demonstrate that most of the representatives from technopolis firms find Turkey's macro-level institutional complementarities effective in the context of their impact on the firm's innovation performance. Particularly, state incentives are regarded as significant to compensate firms' operational costs. The state incentives make it possible for firms to acquire more qualified people with less cost. At the overall level, most of the interviewees declared that Turkey has a *complementary institutional set-up* in the context of innovation. This finding contrasts with the assumptions of the VoC literature.

The VoC approach suggests that firms in a market economy should establish competencies in five areas to overcome the coordination problem. These areas are "corporate governance," "industrial relations," "vocational training and education," "inter-firm relations" and "employees" (Hall & Soskice, 2001).

First of all, the METU Technopolis case includes *effective inter-firm relations*. In terms of the "inter-firm relations" dimension, collaborative R&D effort was emphasized by many participants. Hence, a high level of interaction between technopolis firms and other firms in the ecosystem is observed. Technopolis firms interact with other firms in various ways such as mutual R&D projects, contracting-subcontracting, technology transfer, and mentorship. Technopolis firms execute mutual R&D projects with other firms to fill their competency gaps. The collaborative pattern observed in the MME ecosystem is similar to CMEs. On the other hand, technology transfer is performed rarely. Big state companies execute mutual projects with technopolis firms through sub-contracting. And even firms that

are in the same competitive environment tend to collaborate. Through interacting and collaborating, the firms in the ecosystem increase their innovation performance.

Second, due to *inadequate vocational training and education system*, technopolis firms invest more in employee trainings which creates an additional cost item for firms. In the case study, deficiencies in centrally-organized vocational trainings were raised as a significant problem. Talent shortage, competency deficiencies, increasing training costs, and difficulties in talent retention were addressed during the interviews. Hereby, in terms of vocational training and education system, MME has more similar characteristics to a LME. This competency gap has a negative impact on the R&D and innovation performance of firms.

Third, in the case study, regardless of the firm scale, most of the interviewees declared that they have difficulties funding their R&D activities. Hence due to *inefficient corporate governance*, firms do not have adequate financial resources for their R&D activities. On the other hand, most of the firms located in the technopolis are benefiting from technopolis-specific and/or state incentives at various levels. To ensure their business sustainability, innovation performance, or continuation of R&D projects, subsidies, tax cuts, and other subsidies/incentives are regarded as significant and even vital. In addition to that half of the firms' representatives mentioned that they incentivize their R&D activities through various state incentives as well. However, access to finance is not portrayed as easy as it is in ideal-typical market economies, LMEs, and CMEs. Difficulties in the bureaucratic process for incentives and depreciation of incentives in terms of foreign exchange rates were raised as

significant barriers against the effective utilization of incentives. Inadequate financial resources decrease the innovation performance of technopolis firms.

Fourth, in the case study in terms of the “employees” dimension, *average employee involvement in decision-making for R&D processes* is found. Employees mostly do not participate in decision-making processes for R&D-related activities. R&D decisions are generally made in a unilateral way, similar to LMEs. Top management or client requests are significant in identifying R&D projects. However, in ICT firms R&D decisions are mostly made collaboratively. In general, the vertical hierarchy, expertise, experience level, and inflexible client emerged as significant barriers to employee involvement in the R&D processes. Due to its pattern, average employee involvement in decision-making processes is similar to the employee practices in LMEs.

Fifth, the case study demonstrated that in this innovation ecosystem, there is *limited impact of industrial associations over firms’ innovation performance*. Despite that technopolis firms interact with industry associations, leading companies, and relevant state institutions, these interactions have limited impact on firms’ innovation performance. In this context, this innovation system has similarities with LMEs.

On the other hand, case study findings display that thanks to the *significant impact of place-specific factors and local resources*, technopolis firms’ innovation performance is higher. In the case study, it has been mostly stated that METU Technopolis is a reputable and prestigious innovation system. This location’s prestige helps technopolis firms to expand their businesses. Besides, in terms of talent attraction, the prestige of the innovation system is complementary for firms to

hire high-qualified employees. The ideal location of the technopolis is another complementary factor for candidates to prefer to work in this area. During the interviews, it was also pointed out that the social atmosphere of the technopolis is attracting talent as well. The social facilities it has, the density of the METU alumni population in the technopolis, and the social atmosphere attract high-qualified candidates as well. Having high-qualified employees was addressed as a significant factor in carrying out successful R&D projects and achieving high innovation performance consequently. In addition to that, despite that the SI literature assumes that infrastructure support and area-specific know-how accumulation are also critical local factors that are driving innovation performance, these factors were not addressed as significant factors that have an impact on technopolis firms' innovation performance.

In terms of interdependence, non-linearity, and interaction dimension, the case study demonstrated that there is a *high level of interaction among technopolis firms*. Due to this interaction, technopolis firms perform cross-disciplinary work, they develop mutual products and transfer competencies. From networking to sub-contracting, outsourcing to talent attraction, and mutual R&D activities, they interact on a wide scale. Thanks to agglomeration, technopolis firms interact with other technopolis firms which are co-located in the same area. On the other hand, though in the literature cluster structure is addressed as a significant structure to drive innovation, in the context of innovation performance in METU Technopolis, limited effectivity of cluster structure is observed. Furthermore, the cluster structure in METU Technopolis has a positive impact on firms' business performance due to exhibitions, networking, and business opportunities.

And finally, as an innovation system established nearby a technical university, METU Technopolis has *close cooperation with the university*, METU. In the case study, technopolis firms' representatives stated that they actively cooperate with the university. When they have an operational challenge, they consult academicians. They execute mutual R&D projects. However, in terms of the commercialization of R&D projects' outputs into successful products, there is an improvement area. Thus, theoretical knowledge produced at the university could not usually be turned into commercial products easily.

Representatives from firms with different scales participated in the study. When it comes to the differentiation of findings regarding the firm scale, three areas come into prominence. First, when it comes to the *inadequate vocational training and education system*, it has a more significant impact on micro-scaled and small-scaled firms, which have more limited resources, due to the additional cost it creates. These firms face challenges to allocate additional resources for training activities and utilize online resources accordingly. Second, in terms of *inefficient corporate governance*, access to financial resources and receiving incentives are more critical for micro-scaled and small-scaled firms for their business sustainability. Third, *place-specific factors and local resources* are more significant for micro-scaled and small-scale firms. Being in a technopolis provides certain advantages for new ventures, start-up firms, and talented entrepreneurs who have limited capital. Thanks to be in a dynamic innovation ecosystem, they can interact with other stakeholders, receive guidance, and benefit from the synergy created in this environment.

Representatives from firms that operate in different business areas (defense and aerospace, ICT, electronics, machinery, environment, and healthcare) participated in the study. When it comes to the differentiation of findings regarding the business areas, four areas come into prominence. First, regarding effective *inter-firm relations*, ICT firms execute more R&D projects through technology transfer. Furthermore, several firms operating in defense and aerospace, ICT, and electronics have subcontractor roles for big state-owned companies. Second, despite the *inadequate vocational training and education system*, ICT firms utilize online trainings as a cost-effective solution to provide trainings for their employees. Third, in terms of *inefficient corporate governance*, it is more difficult for firms operating in niche business areas such as healthcare and the environment to reach financial resources easily. Fourth, in terms of average employee involvement in decision-making for R&D processes, ICT firms have a more advantageous position. In ICT firms, employees have more autonomy over decision-making processes in R&D projects.

To sum up, the VoC literature assumes that MMEs are disadvantageous regarding high innovation performance due to a lack of strong institutional complementarities and macro-level coordination. However, the case study demonstrates that institutional complementarities in an MME provide support for firms located in a sub-national innovation system. This support helps firms to produce higher innovation performance. However, when it comes to solving their coordination problem, firms cannot establish competencies in most of the areas identified in the VoC literature. In terms of inter-firm relations, METU Technopolis firms have a high level of effective interaction with other firms. Through

collaborating with other firms, their innovation performance is increasing. On the other hand, due to inadequate vocational training and education system, inefficient corporate governance, average employee involvement in decision-making for R&D processes, and limited impact of industrial associations over firms' innovation performance, in other areas technopolis firms in METU Technopolis cannot establish competencies thoroughly. However, when it comes to having a high innovation performance, there is a significant impact of place-specific factors and local resources on technopolis firms' innovation performance. In terms of interdependence, non-linearity, and interaction dimension, the case study demonstrated that there is a high level of interaction among technopolis firms. And finally, there is close cooperation between the university and the technopolis. In METU Technopolis, rather than market-level factors, meso-level factors have a more significant impact on firms' innovation performance. Thus, local factors and conditions mostly determine the firms' innovation performance.

In the METU Technopolis case, a high level of innovation is achieved thanks to both material and non-material sources of coordination. The findings indicate that non-material sources of coordination such as reputation and prestige, vibrant social atmosphere, and sense of belonging have a significant impact on talent attraction and retention which are regarded as key inputs for achieving innovation. Despite that the innovation outcome-related parameters are mostly formulated on material sources, the findings show that non-material sources may be as significant as the material ones since the innovation is not only the outcome of a technical process but a social one as well.

To sum up, the VoC literature assumes that MMEs are disadvantageous regarding high innovation performance due to a lack of strong institutional complementarities and macro-level coordination. However, the case study demonstrates that institutional complementarities in an MME provide support for firms located in a sub-national innovation system. This support helps firms to produce higher innovation performance. However, when it comes to solving their coordination problem, firms cannot establish competencies in most of the areas identified in the VoC literature. In terms of inter-firm relations, METU Technopolis firms have a high level of effective interaction with other firms. Through collaborating with other firms, their innovation performance is increasing. On the other hand, due to inadequate vocational training and education system, inefficient corporate governance, average employee involvement in decision-making for R&D processes, and limited impact of industrial associations over firms' innovation performance, in other areas technopolis firms in METU Technopolis cannot establish competencies thoroughly. However, when it comes to having a high innovation performance, there is a significant impact of place-specific factors and local resources on technopolis firms' innovation performance. In terms of interdependence, non-linearity, and interaction dimension, the case study demonstrated that there is a high level of interaction among technopolis firms. And finally, there is close cooperation between the university and the technopolis. In METU Technopolis, rather than market-level factors, meso-level factors have a more significant impact on firms' innovation performance. Thus, local factors and conditions mostly determine the firms' innovation performance.

CHAPTER V

CONCLUSION

In this chapter, I will first provide a summary of the context of this dissertation below. And then I will provide a summary of the main findings of the dissertation. In this section, I will first concentrate on the findings from the theoretical discussion and I will cover the findings from the case study. Finally, I will provide further research suggestions.

This dissertation studies the conditions under which innovation would be possible for firms located in Mixed Market Economies (MMEs). It primarily addresses the research question that “How can innovation be possible in an MME?” Besides, it addresses the conditions under which firms in a sub-national innovation system in an MME can produce innovation. Through synthesizing the assumptions of two distinct literatures, VoC and SI, it aims to reach a new perspective to examine the possibility of innovation in an MME and the conditions behind it which make innovation possible.

In today’s global political economy, the innovation performance of market economies determines competitiveness. LMEs and CMEs, which are regarded as ideal-typical markets, are expected to have a higher innovation performance by VoC. On the other hand, MMEs are also addressed in the VoC as the third category. These six markets, located in Southern Europe which are France, Greece, Italy, Portugal, Spain, and Turkey are identified as typical MMEs. These outlier markets are regarded as disadvantageous in terms of high market and innovation performance

due to a lack of strong institutional complementarities and macro-level coordination. Hence, the VoC literature assumes that firms operating in these market economies come across difficulties to overcome the coordination problem in their market economy. Since they are assumably not supported by the institutional set-up thoroughly, they cannot solve this coordination problem. Consequently, MMEs are considered as the third and the outlier category which do not fit into the bifurcation of ideal-typical markets.

In this dissertation, the conditions which make innovation possible in an MME are addressed. Despite that the conventional VoC literature assumes that MMEs are disadvantageous to produce innovation, there are successful innovation systems at the sub-national level in MMEs such as Emilia-Romagna Region in Italy, Kriti Region in Greece, Norte Region in Portugal, Basque Region in Spain, Sophia Antipolis Technopolis in France and METU Technopolis in Turkey. Hence, the emergence of these successful ecosystems creates a puzzle that is addressed in this study.

This dissertation address this puzzle and within the scope of this dissertation, I argue that innovation is produced in an MME, which is considered an unlikely land to produce innovation, due to certain type of coordination which is made possible by non-material and material sources of coordination.

5.1 Main Findings of the Dissertation

VoC literature studies the market economies by positioning the firm in the center. Firms in market economies are regarded as profit-oriented entities that try to maximize their utilities by interacting with other stakeholders in the market (Hall & Soskice, 2001, p. 6). In the VoC approach, it is assumed that firms in a market economy come across a coordination problem. If they would interact with other stakeholders in the market effectively, they are assumed to perform better. Hence, at the aggregate level, the market economy would perform better accordingly. To overcome the coordination problem, firms are expected to establish competencies in five areas which are “inter-firm relations,” “vocational training and education system,” “corporate governance,” “internal structure/employees” and “industrial relations” (Blyth, 2003, p. 216; Hall & Soskice, 2001, p.7).

In the VoC, institutional complementarities in a market economy are regarded vital for firms to overcome the coordination problem. In addition to that, institutional settings are assumed to identify the characteristics of the markets (Blyth, 2003, p. 216; Jackson & Deeg, 2008, p. 541; Schneider et al., 2010, p. 248). Regarding the characteristics of markets, two ideal-typical models rather than the single ideal market economy model which are Liberal Market Economies (LMEs) such as the United States and the United Kingdom, and Coordinated Market Economies (CMEs) such as Germany or Sweden are provided in the VoC. While LMEs are identified with “neoliberal policies, radical innovation, new sectors of the economy” (Crouch, 2005, p. 442), CMEs are identified with “non-market coordination” (Hall & Soskice, p. 22) and incremental innovation.

The VoC defines a third market economy category which is named as Mediterranean Market Economy or Mixed Market Economy (MME). Six countries located in Southern Europe which are Greece, France, Italy, Portugal, Spain, and Turkey are identified as MMEs (Hall & Soskice, 2001, p. 21). The MMEs are identified with “the existence of a large set of family-based small firms,” “cross-participation in firms’ governance” and “prominent role of the state in the economy” (Vallejo-Peña & Giachi, 2018, p. 24). These outlier markets are regarded as underperformers compared to “pure LMEs and CMEs” (Bohle & Greskovits, 2009, p. 360; Hall & Gingerich, 2009, pp. 459-460; Hall & Soskice, 2001; Jackson & Deeg, 2008, p. 547; Malik, 2017, pp. 324-325; Nölke, 2018, p. 271). Due to a lack of strong institutional complementarities and macro-level coordination, the VoC literature regards MMEs as underperformers in terms of economic and innovation performance.

In this dissertation, certain findings are addressed regarding the VoC literature. First, the literature is not clear on identifying what the key institutions are to produce innovation in a market economy. Second, this literature does not specify which coordinating functions institutions play in producing high innovation performance. And third, the literature categorically assumes that innovation is coordinated at the national level, therefore, a market economy that is not akin to LMEs or CMEs will not perform high in innovation outcomes. Since, in the VoC, MMEs are regarded as disadvantageous market economies to produce innovation, to examine the conditions under which firms in MMEs can produce innovation, SI literature and its spin-off literatures which are NIS and SNIS are consulted and reviewed within the framework in this dissertation.

In the SI literature, innovation is considered an outcome that is produced through the interaction of various stakeholders in an ecosystem. It is not addressed as an outcome of a linear process but its “interdependence and non-linearity” dimension is highlighted” (Edquist, 2006). Besides, the institutional setting in an ecosystem is regarded as significant for its complementary role in producing innovation. Firms’ innovation performance is influenced by institutions and organizations in the ecosystem.

As spin-off literature, in NIS similar to VoC, innovation outcome in a market economy is considered to be shaped by the macro-level institutional complementarities in a market economy (Balzat, 2002, p. 11). The NIS approach highlights that systemic cooperation at the national level determines the innovation outcome in a market economy ” (Samara et al., 2012). However, on the contrary, the SNIS approach suggests that at the sub-national level, nation-level coordination and strong institutional complementarities may not be prerequisites for innovation to be produced within an ecosystem. As it is addressed in this approach, at-sub-national level thanks to “place-specific” and “non-economic factors,” competitive advantage for producing innovation can be obtained (Asheim & Isaksen, 2002, p. 77). Besides, local infrastructure and “knowledge generation subsystems” can contribute to the production of innovation” as well (Asheim & Coenen, 2005, p. 1177). Thus, in a country, there may be many successful innovation systems at the sub-national level, though the overall innovation performance of the market economy is not high. In the MMEs that are regarded as disadvantageous to produce innovation, there are emerging successful innovation systems at the sub-national level. Emilia-Romagna region in Italy, Kriti (Crete) Region in Greece, Norte Region in Portugal, the Basque region in

Spain, Sophia-Antipolis Technopolis in France, and METU Technopolis in Turkey can be given as examples of successful SNIS cases in MMEs.

In this dissertation, certain findings are addressed regarding the SI literature. Firstly, SI literature regards the innovation outcome similarly as it is examined in the VoC. Innovation outcome in a market economy is based on the interaction of various stakeholders within the market. Second, the NIS approach assumes that the innovation outcome in a market economy is identified with the institutional set-up of a country and organizational layout at the national level. Third, in contrary SNIS approach suggests that the coordination at the sub-national level, regional or local, and institutional layout embedded in the regional and local structures are vital to high innovation performance. Hence, regardless of strong macro-level institutional complementarities and macro-level coordination, due to place-specific factors, local knowledge structure, regional institutional structure, and sub-national level coordination, high innovation performance would be possible in an innovation system.

Within the scope of this dissertation, nine variables were generated from two literatures, VoC and SI. While from the VoC literature, the variables of “macro-level institutional complementarities,” “inter-firm relations,” “vocational training and education system,” “corporate governance,” “employees” and “industrial relations” were generated, from the SI literature “place-specific factors and specific local resources,” “interdependence & non-linearity and interaction” and “generation, use, and dissemination of knowledge” variables were generated. These variables led to the interview guideline for the case study.

In this dissertation, a case study was conducted in METU Technopolis of Turkey to understand “under which conditions would innovation be possible in an MME?” The case study includes seventeen in-depth interviews conducted with the representatives of a sample of firms operating in different business areas. And this case study generated empirical findings consequently.

Despite that the VoC literature assumes that due to a lack of strong institutional complementarities, high innovation performance cannot be achieved in an MME, the empirical findings demonstrate that Turkey, as an MME, has a *complementary institutional set-up* in the context of innovation. This finding significantly contrasts with the assumption of the VoC literature.

On the other hand, when it comes to elaborating the areas that firms should establish competencies to overcome the coordination problem, the empirical findings show that firms in an MME ecosystem cannot overcome the coordination problem easily and firms cannot establish competencies thoroughly in the four of five areas addressed in the VoC literature.

First, in the case study, the findings show that in METU Technopolis there are *effective inter-firm relations*. Firms interact with each other and collaborate for R&D-related projects and close their competency gaps through cooperation. Besides, various types of interaction between firms such as mutual R&D projects, contracting-subcontracting, technology transfer, and mentorship are observed. Though they do not perform technology transfer extensively, they execute mutual R&D projects.

Second, due to *inadequate vocational training and education system*, firms in the technopolis make additional investments in their employees' trainings. Moreover, talent shortage, competency deficiencies, increasing training costs, and difficulties in talent retention are the emerging sub-themes from the case study. Hence, the competency gap is a barrier to higher innovation performance. Therefore, a vocational training program to be established by the technopolis administration would support technopolis firms to gain more competencies for their employees.

Third, technopolis firms come across difficulties to fund their R&D activities. Due to *inefficient corporate governance*, firms do not have adequate financial resources for their R&D activities. On the other hand, almost all technopolis firms benefit from technopolis-specific and/or state incentives at various levels, the empirical findings demonstrate that firms find these incentives vital for the continuation of their business. Difficulties in the bureaucratic process for incentives and depreciation of incentives in terms of foreign exchange rates were raised as significant factors which have a negative impact on firms' innovation performance. An inadequate financial resource dimension is regarded as a negative factor in firms' innovation performance.

Fourth, in the case study when it comes to the participation in decision-making processes for R&D projects, *average employee involvement in decision-making for R&D processes* is found. Employees mostly do not participate in decision-making processes. R&D-related decisions are mostly made at the top management level and declared in a unilateral way or shaped by the client's requests. The vertical hierarchy

in the firms, expertise and experience level, and inflexible client emerged as significant barriers to employee involvement in the R&D processes.

Fifth, empirical findings demonstrate that in the technopolis ecosystem, there is *limited impact of industrial associations over firms' innovation performance*. Though the firms interact with industry associations, these interactions do not have a significant impact on their R&D and innovation performance.

Despite that the overall ecosystem does not provide support for firms' high innovation performance, thanks to technopolis-related factors, technopolis firms have high innovation performance. The empirical findings demonstrate that due to the *significant impact of place-specific factors and local resources*, technopolis firms' innovation performance is higher. Firm representatives consider METU Technopolis as a reputable and prestigious innovation system. Due to this dimension, their businesses are regarded as more valuable. In addition to that, in terms of attracting talent, this dimension is regarded as complementary to hiring more qualified employees. The reputation and prestige dimension makes this area a center of gravity for social capital. Besides, the ideal location of the technopolis and the social atmosphere within the technopolis are also regarded as the positive factors which have an impact on talent attraction. Having qualified employees is considered a significant advantage to carry out successful R&D projects, hence increasing their innovation performance. On the other hand, the infrastructure support and area-specific know-how accumulation were not addressed as the significant factors that have an impact on their innovation performance.

The case study findings demonstrate that there is a *high level of interaction among technopolis firms*. On a wide scale from networking to sub-contracting, outsourcing to talent attraction, and mutual R&D activities, technopolis firms interact with each other. Agglomeration of firms in the same area creates an advantage for this interaction. However, though it is ideally narrated in the literature, in the technopolis limited effectivity of cluster structure on firms' innovation performance is observed. Hence, restructuring the cluster structure regarding its impact on firms' innovation performance would contribute to the overall innovation performance of the technopolis.

Firms in the technopolis have *close cooperation with the university, METU*. Firms consult academicians when they need and they execute mutual projects. However, the commercialization of the outputs of the R&D projects is regarded as an improvement area. At this point, a particular initiative to be executed in the technopolis to examine the success of converting R&D projects' outputs into commercial products would contribute to the overall innovation performance of the technopolis.

Last but not least, despite that at a macro-level the MME is regarded as disadvantageous to produce innovation due to a lack of strong macro-level institutional complementarities and macro-level coordination, at the sub-national level in an MME, high innovation performance can be achieved thanks to place-specific factors and local resources and high level of interaction with stakeholders at sub-national level.

The case study findings manifest that despite that the innovation outcome is mostly identified with material sources of coordination, it should also be considered that the non-material sources of coordination such as prestige and reputation, vibrant

social atmosphere, and sense of belonging have a significant impact over the innovation outcome as well. For this reason, the innovation outcome should not solely be regarded as a product of a technical process, but a social one. In addition to that human factors in the process are equivalent to the technical factors in the context of achieving innovation success.

5.2 Further Research Suggestions

This dissertation addresses the conditions under which innovation would be possible in an MME. Due to several research limitations such as the chosen methodology, the scope of this research is limited to a single case study. Regarding the theoretical and empirical findings of this dissertation, several suggestions can be provided for further research.

First, six MMEs that are Greece, France, Italy, Portugal, Spain, and Turkey are addressed in the VoC literature, and in this dissertation, the Turkey case is addressed. Hence, regarding the theoretical findings of this dissertation, researchers may be interested in conducting similar research in the sub-national innovation systems of other MMEs. Besides, having a comparative analysis among several sub-national innovation systems in several MMEs would contribute to the literature.

Second, since the MME is regarded as the third and outlier market category in the VoC literature, there is substantially limited research on MMEs compared to LMEs and CMEs. While the innovation pattern of LMEs is regarded as radical innovation and the innovation pattern of CMEs is regarded as incremental innovation, no specific innovation pattern is defined for MMEs in the literature. Hence, the researchers may be interested in identifying the particular innovation pattern in MMEs.

Third, despite that the literature includes extensive studies with cross-country comparisons among LMEs and CMEs regarding innovation performance, there is limited research on cross-country comparisons among LMEs/CMEs and MMEs. Furthermore, this research may be extended to cross-country comparisons with other market categories such as DMEs/HMEs.

Fourth, despite that China is one of the biggest market economies in the world, in the context of VoC and innovation performance, there is substantially limited research on China. Hence, the researcher may be interested in identifying the innovation pattern of this market economy and examining the conditions under which innovation would be possible in this market economy regarding the assumptions of VoC and SI literatures.

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APPENDIX I

A. CONSENT FORM FOR THE INTERVIEWEES (*in Turkish*)

BİLGİLENDİRİLMİŞ ONAM FORMU

Araştırmacı

Olgu Dervişler, Doktor Adayı

Danışmanı: Hasan Tolga Bölükbaşı

İ.D. Bilkent Üniversitesi Siyaset Bilimi ve Kamu Yönetimi Bölümü, Bilkent, Ankara
(TR) 06800

E-posta: [REDACTED]

Katılımcı

Adı Soyadı:

E-posta:

ARAŞTIRMA PROJESİ HAKKINDA BİLGİLER

Katılmak üzere olduğunuz çalışmanın başlığı ‘Karma Pazar Ekonomilerinde İnovasyon’dur. Bu çalışma kapsamında, Türkiye’nin inovasyon ekosisteminde yer alan firmaların Ar-Ge ve inovasyon çalışmalarına yönelik sorular iletilecektir. Çalışmanın amacı, karma pazar ekonomilerinde firmaların inovasyon ekosistemiyle etkileşiminin koordinasyon becerileri bağlamında değerlendirilmesidir. Bu sebeple karma pazar ekonomisi özellikleri taşıyan Türkiye’nin inovasyon performansı anlamında önde gelen teknokentlerinden olan ODTÜ Teknokent’teki firmalar çalışma kapsamına alınmıştır.

MÜLAKAT HAKKINDA BİLGİLER

Çalışma kapsamında, katılımcılar yarı yapılandırılmış bir mülakata davet edilmektedir. Çalışma tamamıyla gönüllülük esasına dayanmaktadır. Katılımcılar istedikleri zaman, görüşmenin herhangi bir noktasında mülakatı sonlandırabilirler. Mülakatın yaklaşık 1 saat sürmesi planlanmıştır.

Araştırma dahilinde kişisel bilgilerin ve verilerin gizliliğinin ve güvenilirliğinin korunmasına azami ölçüde dikkat edilmektedir. Mülakat yapılan kişilerin kimlik bilgileri, çalıştıkları şirket ve pozisyonları anonimleştirilecek, çalışma dokümanlarında ve yayınlarda kullanılmayacaktır ve kesinlikle paylaşılmayacaktır.

Her bir mülakata bir numara verilecek; kişinin unvanı ve çalıştığı şirketin ismi şirketin faaliyet alanı bilgisi kullanılarak anonimleştirilecektir. Elde edilecek kişisel bilgiler yalnızca araştırmacı ve danışmanın erişim yetkisinin olduğu şifrelenmiş bilgisayarda tutulacaktır.

Bu çalışmadan elde edilecek bilgiler, kişisel veriler ve demografik bilgilerden arındırılmış şekilde, yalnızca araştırmacının doktora tezinde ve yayınlanacak bilimsel çalışmalarda kullanılacaktır. Bu yayınlarda mülakata katılan kişilerin adları, çalıştıkları şirketin ismi ve demografik bilgiler yer almayacaktır.

Katılımcının izni olması halinde görüşmelerde sesli kayıt alınacaktır. Görüşme çevrimiçi platform üzerinde yapılıyorsa, yine katılımcının izni olması halinde görüşme kaydedilecektir. Ses veya görüşme kaydına izin verilmemesi durumunda görüşmelerde ifade edilen yanıtlar araştırmacı tarafından not alınacaktır.

Bu çalışmaya katılım tamamıyla gönüllülük prensibine dayanmaktadır. Araştırma dahilinde, sizin kişisel görüşlerinizin ve değerlendirmelerinizin öğrenilmesi hedeflenmektedir. Çalışmanın amacına ulaşabilmesi için size yöneltilen soruları eksiksiz ve kimsenin baskısı altında olmadan, en uygun olduğunu düşündüğünüz yanıtları verecek şekilde cevaplamanız beklenmektedir.

Bu formu okuduktan sonra onaylamanız, araştırmaya katılmayı kabul ettiğiniz anlamını taşımaktadır. Ancak, isterseniz çalışmaya dahil olmama veya katıldıktan sonra istediğiniz zaman bırakma hakkına da sahiptir.

ARAŞTIRMACIYLA İRTİBAT KURULMASI

Yukarıda sunulan bilgiler dışında, araştırma veya araştırmacıyla ilgili ek bilgiye ihtiyaç duyarsanız; görüşme sonrasında da [REDACTED] e-posta adresinden ve 053. no'lu telefondan araştırmacıya ulaşabilirsiniz. Araştırma tamamlandığında araştırma sonuçlarına ilişkin olarak bilgilendirilmek isterseniz araştırmacıya bu talebinizi de iletebilirsiniz.

ONAY

Araştırma ile ilgili katılımcıyı bilgilendirmek için yukarıda sunulan bilgileri okudum ve katılım göstermemin istendiği çalışmanın kapsamını ve amacını, gönüllü katılımcı olarak üzerime düşen sorumlulukları anladım. Çalışma hakkında yukarıda adı geçen araştırmacı tarafından sözlü olarak da bilgilendirildim. Bu koşullarda ben, ... söz konusu araştırmaya kendi isteğimle, hiçbir baskı olmaksızın katılmayı kabul ediyorum.

Aydınlatılmış onay formunu okudum ve özgür irademle çalışmaya katılmayı (lütfen uygun seçeneği işaretleyiniz)

- ☐ Kabul ediyorum
- ☐ Kabul etmiyorum

Görüşme esnasında ses kaydı (çevrimiçi platformda görüşme yürütülüyorsa görüşme kaydı) alınmasını (lütfen uygun seçeneği işaretleyiniz)

- ☐ Kabul ediyorum
- ☐ Kabul etmiyorum

İmza:

Tarih:



APPENDIX II

Interviewee	Status	Format	Length	Recording	Transcript
1. Mid-Scaled Defense & Aerospace Firm (R&D Manager)	Online Meeting 21.04.2022, 7 pm (Pilot Interview)	Semi-Structured (Guided by Dissertation Supervisor)	2 hours	Yes	Audio Recording Transcript
2. Micro-Scaled Healthcare Firm (Owner)	Online Meeting 22.04.2022, 4 pm	Semi-Structured	1 hour	Yes	Audio Recording Transcript
3. Small Scaled ICT Firm (Owner)	Online Meeting 26.04.2022, 10 am	Semi-Structured	1 hour	Yes	Audio Recording Transcript
4. Mid-Scaled ICT Firm (Owner)	Online Meeting 26.04.2022, 11.30 am	Semi-Structured	1 hour	Yes	Audio Recording Transcript
5. Mid-Scaled Electronics Firm (R&D Responsible)	Online Meeting 26.04.2022, 1.30 pm	Semi-Structured	1 hour	Yes	Audio Recording Transcript
6. Mid-Scaled Electronics Firm (Owner)	Online Meeting 26.04.2022, 3 pm	Semi-Structured	1 hour	Yes	Audio Recording Transcript
7. Mid-Scaled ICT Firm (R&D Manager)	Online Meeting 26.04.2022, 4.30 pm	Semi-Structured	1 hour	Yes	Audio Recording Transcript
8. Large Scaled ICT Firm (R&D Manager)	Online Meeting 27.04.2022 9 am	Semi-Structured	1 hour	Yes	Audio Recording Transcript
9. Small Scaled Machinery Firm (Owner)	Online Meeting 27.04.2022 11 am	Semi-Structured	1 hour	Yes	Audio Recording Transcript
10. Small Scaled ICT Firm	Online Meeting 27.04.2022 2 pm	Semi-Structured	1 hour	Yes	Audio Recording Transcript

11. Small Scaled Environment Firm (Owner)	Online Meeting 27.04.2022 4 pm	Semi-Structured	1 hour	Yes	Audio Recording Transcript
12. Large Scaled Machinery Firm (R&D Responsible)	Online Meeting 27.04.2022 5.30 pm	Semi-Structured	1 hour	Yes	Audio Recording Transcript
13. Mid-Scaled ICT Firm (Vice President)	Online Meeting 29.04.2022 9 am	Semi-Structured	1 hour	Yes	Audio Recording Transcript
14. Small Scaled ICT Firm (Owner)	Online Meeting 06.05.2022 11 am	Semi-Structured	1 hour	Yes	Audio Recording Transcript
15. Small Scaled ICT Firm (R&D Responsible)	Online Meeting 18.05.2022 1 pm	Semi-Structured	1 hour	Yes	Audio Recording Transcript
16. Mid-Scaled ICT Firm (Owner)	Online Meeting 18.05.2022 4 pm	Semi-Structured	1 hour	Yes	Audio Recording Transcript
17. Micro-Scaled Electronics Firm (Owner)	Online Meeting 19.05.2022 10 am	Semi-Structured	1 hour	Yes	Audio Recording Transcript