

MECHANICAL ENGINEERING | PHYSICS |
PRESERVATION OF THE ARCHITECTURAL HERITAGE
| SPATIAL PLANNING AND URBAN DEVELOPMENT
| STRUCTURAL SEISMIC AND GEOTECHNICAL
ENGINEERING | TECHNOLOGY AND DESIGN FOR
ENVIRONMENT AND BUILDING | TERRITORIAL
DESIGN AND GOVERNMENT | URBAN PLANNING,
DESIGN AND POLICY | AEROSPACE ENGINEERING
| ARCHITECTURAL AND URBAN DESIGN |
ARCHITECTURAL COMPOSITION | ARCHITECTURE,
BUILT ENVIRONMENT AND CONSTRUCTION
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| INTERIOR ARCHITECTURE AND DESIGN |
MANAGEMENT ENGINEERING | MATERIALS
ENGINEERING | MATHEMATICAL MODELS
AND METHODS IN ENGINEERING



Chair:
Prof. Paolo Trucco

DOCTORAL PROGRAM IN MANAGEMENT ENGINEERING

Introduction

The Ph.D. Program in Management Engineering (DRIG) offers students advanced training and preparation to conduct research in the field of management, economics and industrial engineering. It aims at training professionals who are able to carry out high-quality research in the fields of management, economics and industrial engineering at universities or other research institutions. Ph.D. graduates from DRIG are also well equipped with distinctive skills and advanced knowledge to pursue a professional career in manufacturing and service companies, regulatory authorities and other public bodies. The program allows the student to develop a sound methodological background and multidisciplinary knowledge by attending courses designed to provide a multiplicity of visions, theories and approaches, a broad cultural panorama. The program emphasizes the benefit of studying problems in an innovative manner, combining various analytical approaches and research methodologies.

The commitment of the Department of Management, Economics and Industrial Engineering (DIG) to research and scientific cooperation with other academic institutions, major industrial companies and other organisations creates an ideal environment in which for students to acquire leading-edge knowledge and cultivate their own research interests in a broad range of research subjects.

Ph.D. Program Structure and Contents

The Full Time doctoral program covers three years, whereas the Executive Program lasts four years. They are entirely taught in English.

The Faculty of DRIG includes, in addition to professors of the Department of Management, Economics and Industrial Engineering, several international scholars: Rodney Turner, Editor of the International Journal of Project Management; Mike Wright, Imperial College London, UK; Irvine Lapsley, University of Edinburgh, UK; Hans De Bruijn, Delft University of Technology, The Netherlands; Abraham B. Rami Shani, California Polytechnic University, USA; Christopher Worley, University of Southern California, USA; David Coghlan, Trinity College Dublin, Ireland;

Donald Huisingsh, University of Tennessee, USA;
Tobias Kretschmer, Ludwig-Maximilians-Universität München, Germany.

The program covers three main types of training activities.

Main courses

- Mandatory courses in Epistemology of Research in Social Sciences and Academic Publishing.
- Methodological courses, addressing specific research methodologies and related skills relevant to research in management, economics and industrial engineering;
- Thematic courses, aiming at introducing students to the reference theoretical background and the cutting edge research in specific disciplines, such as Entrepreneurship and Entrepreneurial Finance, Innovation Economics and Management, Supply Chain Management, Organisational Theory and Design, Service Operations Management, Enterprise and Operations Risk Management, Sustainability and Social Challenges in Industrial Systems.

Elective courses and training in specific themes

Elective training activities are customised according to the specific needs and research interests of students. The aim is to extend the scientific knowledge of students in very specific topics and to introduce them to the international research community through their active participation to international scientific conferences and PhD schools.

Thesis

The aim of the PhD programs at Politecnico di Milano is to instil in candidates a research-oriented mind-set, along with expertise and skills relating to a specific research topic. To develop a research-oriented mentality, candidates must acquire the ability to solve complex problems, including a thorough analysis of the problem, identification of an original solution and the ability to evaluate the solution and its applicability in given contexts. PhDs who possess these abilities will have greater opportunities for advancement in research positions, both in the academic environment as well as in public and private organisations.

The main goal is the development of an original research contribution. The Ph.D. thesis should help increase knowledge in the applicant's research field. It also needs to be consistent with the research topics studied at the Department. The final thesis can be submitted in the form of either a monograph or an edited compilation of papers. The research projects presented in the following section are typical examples of the research work carried out by DRIG students.

Scientific and Industrial Collaborations

Students are required to spend at least one semester in a foreign research institution. In addition, students are encouraged to attend doctoral schools and workshops organized by other institutions and to participate in international scientific conferences. The presentation of an original research work in an international conference is mandatory for admission to the final exam. To his end, students are granted of a personal research budget, covering a three years research period, and have access to mobility support measures aimed at promoting international collaborations between the doctoral programs in Europe and overseas.

- In addition, Double Degree agreements are in place at the PhD level:
- EDIM (European Doctorate in Industrial Management, www.edim-phd.eu) is an Erasmus Mundus Joint Doctoral Programme run by KTH (Sweden, Co-ordinator), POLIMI (Italy) and UPM (Spain) and is funded by the European Commission (EACEA);
- Double Degree Program with the Pontificia Universidad Católica de Valparaíso (Chile), Escuela de Ingeniería Industrial, Doctorado en Ingeniería Industrial (started in 2013).

DRIG has also developed several research collaborations with private manufacturing and service firms, regulatory bodies, and other public research institutions to fund PhD oriented research. In recent years, the following organisations supported DRIG Scholarships: Value Partners, TXT e-solutions, D'Appolonia, Consorzio MIP, Fondazione Rosselli, Eupolis, Società Banknord GE.PA.FI. SIM, Siemens, ANIMP-OICE-FONDAZIONE LUIGI DE

JANUARIO, PIRELLI & C., EUROCONTROL, C.T.G.
Italcementi Group, Telecom Italia.

Professional opportunities and the job market

Typical career opportunities opened up by the doctoral program include:

- Post Docs, research fellows and young lecturers at Italian and foreign universities;
- Researchers and scholars in Management Engineering at public and private organisations;
- Highly qualified personnel at research and training institutions, or at technology transfer centres in Italy and abroad;

- Professionals at leading management and strategic consulting firms who can provide deep and advanced insights into companies' business areas;
- High-level professional roles at national and international public institutions;
- Managerial roles at multinational companies with a strong focus on innovation;
- Entrepreneurs in contexts characterised by a high level of innovation.

Support actions for placement are provided with the purpose of sharing experiences, services and information through a number of initiatives fitting the different types of career opportunities. Particular emphasis is given to career development in the Management Engineering area.

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BREAKING UP THE GLOBAL VALUE CHAIN: DYNAMICS AND PERFORMANCE

Albertoni Filippo – Supervisor: Prof. Lucia Piscitello

The thesis studies the breaking up of the global value chain and the dynamics over time in the offshoring of business services. Companies increasingly relocate from advanced to emerging economies not only production activities, but also business services. Indeed, in the last 15 years, the offshoring of business services has shown an impressive growth; not only simple tasks, but also high-value added activities –such as R&D, engineering and product design– have been increasingly relocated. Furthermore, in the last few years, a new and opposite phenomenon compared with offshoring has been emerging; companies have been bringing back to the headquarters' location some business functions. Therefore, this thesis investigates the dynamics following the strategic decision to offshore business activities abroad. The work is a collection of seven papers, with the first chapter being the introductory cover essay summarizing the main findings (i.e. chapter 1). The thesis is then structured in three main parts with each chapter analysing in-depth the research issues. Chapters 2 and 3 provide a general statistical overview of the offshoring and reshoring of business services. Chapters 4 and 5 deal with the persistency and the evolution over

time of the mode of entry (i.e. the change from one contractual form to another). Chapters 6 and 7 specifically study the dynamics regarding the location adopted by offshoring companies (i.e. the emerging phenomenon of the reshoring of business services). It is worth noting that the thesis is paper-based, therefore each chapter addresses an autonomous topic and it follows its own publication strategy. Moreover, each paper adopts a specific theoretical framework; the theories adopted span from the offshoring literature to the international business theory and from the evolutionary economics to the real option framework. The database adopted in this research is mainly the one provided by the Offshoring Research Network (ORN) that allows a throughout investigation of the phenomenon of offshoring of business services. In some chapters, the ORN database has been integrated also with other datasets. The next few lines provide a general overview of each paper. The second chapter describes the offshoring of business services using some descriptive statistics and it shows how high value-added business services are increasingly offshored. For these activities, companies prefer captive rather than outsourcing

entry modes, probably in order to guarantee adequate protection of knowledge. Moreover, data show that European companies show a slight preference for wholly owned solutions, while US and Canadian companies are more likely to adopt outsourcing solutions. India is the main recipient of offshoring initiatives, probably because it offers not only low cost skilled labour, but also qualified service providers. The main drivers of the offshoring of business services are the need to attain cost-savings and to access to qualified personnel. In this context, wholly owned entry mode seems to be more performing than outsourcing in achieving both savings and high quality standards. The third chapter sheds light on the re-shoring of business functions. Indeed, policy makers and scholars are increasingly interested in the relocation of once offshored activities; however, the empirical evidence is mostly focussed on manufacturing activities, while very little is known about business functions that assist manufacturing activities. Therefore, this chapter provides some empirical evidence regarding the plans to re-shore administrative and technical work. In particular, the chapter analyses the entry-mode, the home and the host country context, the

business functions, the industries, the size and the performance of once offshored activities that are planned to be re-shored. Despite the abundance of studies on offshoring and entry mode choices, it is still not clear whether relying on former entry-specific experience allows enhancing the outcome of the offshoring venture. Thus, the fourth chapter, while confirming that several companies adopt the same entry mode of the past, finds that the repetition of previous entry modes increases the focal initiative performance, but only when the company internalizes previous outcomes. Conversely, the inertial repetition of routines associated to previous entries does not lead to an increase of the outcome. Although empirical evidence shows that offshoring companies tend to be persistent in their entry mode choices (as stated

above), the current global scenario is demanding greater strategic flexibility to companies. In this context, real options are studied as a feasible solution to attain the required flexibility and to switch from one entry mode to another over time. By use of a risk tolerance simulation model in the context of an international joint venture, the fifth chapter demonstrates how a real option exchange appears as a win-win strategy for two business parties with asymmetrical risk profiles. The chapter exemplifies and discusses also the reciprocal use of Real Options in the context of other types of interfirm collaboration such as franchising and outsourcing. Offshoring companies attain flexibility relying not only on contractual clauses, but also on the possibility to relocate their activities over time. Indeed,

companies are increasingly reshoring their activities. The sixth chapter provides a picture of what we know regarding the companies returning from offshore and what are the main open research issues in the field. The seventh chapter finds that the reshoring of business services is the result both of company response to performance shortcomings of the initiative offshored and of the persistence with original offshoring strategy (disintegration advantages, accessing new markets and cost-saving). Further understanding of the offshoring phenomenon provides meaningful insights not only for research, but also for managers and policy makers, challenged by the threats and opportunities of global markets. Thus, each chapter of the thesis provide throughout investigation and detailed answers to the relevant research issues.

BE SUSTAINABLE TO BE INNOVATIVE; THE NEED FOR INNOVATION RECONCILEMENT RESOURCE, CAPABILITY, PROCESS SETTINGS

Behnam Sarah – Supervisor: Prof. Raffaella Cagliano

Sustainability is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs. Despite sustainability's recognized importance, managers yet wonder whether existing paths are sufficient. As a result, innovation has emerged as a persuasive means to enhance sustainability. Sustainability would act as a driver for innovation, offering businesses environmental and social returns beyond economic benefits. Further, innovations aimed at sustainable development are critically beneficial for firms. This Ph.D. dissertation extends this debate by providing multiple empirical and theoretical features through a multi-level analysis. The 1st and 2nd analyses test the interrelationship of sustainability and innovation through a robust generalizable empirical basis on firm-level and supply-chain level operations. The 3rd, 4th and 5th analyses focus on innovations aimed at sustainability and scrutinize how should firms reconcile their (open) innovation capability and process for the particular sustainability context. In particular, the 3rd is a firm-level perspective, which explores the ways firms should adjust their innovation resources and capabilities according to develop sustainability oriented innovations. The 3rd and 4th focus on

sustainability oriented innovation projects to understand how firms should reconcile their conventional open innovation capability and innovation process for sustainability context. For the course of first two studies, prior research on the interrelationship between sustainability and innovation development provide valuable insights on cases where sustainability orientation/programs influences firms to adopt innovation as a priority and its programs or vice versa. However, there is a lack of investigation on their simultaneous interaction to shed light on whether firms should focus on one before the other or if they should adopt them at the same time. Additionally, the majority of studies lie in showing successful cases or projects, and there is a lack of generalizable large-scale empirical investigations. Finally, the adoption of sustainability or innovation programs enhances the business performance, whereas prior investigations on the inter-relationship between sustainability and innovation either lack taking into account the performance perspective or investigate the unidirectional relationship. Thus, in the first phase of this PhD, we investigate on a large and generalizable empirical basis the relationship between sustainability

and innovation on three different levels through following hypothesis (Study A).

H1: The pursuit of sustainability priority leads to the pursuit of innovation priority (and vice-versa).

H2: The adoption of sustainability action programs leads to the adoption of innovation action programs (and vice-versa).

H3: Sustainability performance positively affects innovation performance (and vice-versa).

Additionally, previous studies propose influencing factors on the interrelationship between sustainability and innovation. From which, supplier integration and cross-functional coordination have identified as positive influencing factors. However, there are both positive and negative evidences on the relationship between customer integration and adopting sustainability practices and innovation mechanisms. The reason behind contrasting results could be due to the fact that supply chain elements effect each other but prior investigations lack an integrated perspective of supply chain. Therefore, this Ph.D. work advances the work by examining interrelationship between adoption of sustainability practices, innovation mechanisms and supplier-internal-customer integration by answering to the

following research question:

- What is the interrelation between supplier-internal-customer integration, adoption of sustainability practices and adoption of innovation mechanisms? (Study B)

As a result of positive and significant correlation between sustainability and innovation in firms and its supply chain, a growing business initiative has emerged where firms establish strategically innovations particularly aimed at sustainable development (motivation behind studies C-D- and E). Thus, there exists a literature surge on innovations aimed particularly at sustainable development. The prior research in this area, peruse the evolution of new products, processes and management systems with foundations of environmental, social, and economic goals. Despite the increasing interest in developing these initiatives by businesses, their management seems to be quite challenging and complex. Even though, innovation theories/frameworks can be applicable to support businesses facing the

raised challenges, the particular context of sustainability brings forward number of distinctness from conventional forms of innovation. Preceding insights on sustainability context peculiarities, offer the need of conventional innovation adjustment in capability development, required cooperation or the development process. Accordingly, the following multi-level research questions were formulated to build the further steps of this Ph.D. work:

When innovations are aimed particularly at sustainable development:

- Which intangible resources and capabilities require adjustment? (Study C)
 - Which open innovation capabilities require reconciliation? Does it depend on the outcome characteristic? If so, how? (Study D)
 - What are the key areas where process adjustment is needed? Does it depend on the outcome characteristic? If so, how? (Study E)
- Coherently with the aim of this work, and to answer the multi-level research questions, multi-

methodological approaches are needed. Addressing this need, this Ph.D. dissertation is based on multi-methodological approach. The following table (Table 1) summarizes the studies composing this dissertation in terms of detailed method and the main findings. Results can add value in theory and practice. This study complement the research frontiers on sustainability by proposing new foundations in further understanding its relationship with innovation management. Further, this work contributes to multi-disciplinary theoretical domains including capability view and open innovation by empirically testing innovation resources and (open) innovation capabilities and process adjustments in multiple innovation cases targeting sustainable development. From a managerial perspective, we show managers that by being sustainable, you can be innovative. In a similar vein, we suggest practitioners on how to build or leverage their conventional innovation resources, capabilities and process to develop successful innovations for peculiar context of sustainability.

TABLE 1. SUMMARY OF THE PAPERS COMPOSING THIS DISSERTATION

Study	Method	Findings
A	Survey (860 respondents)	Sustainability propensity acts as an antecedent of innovation propensity while they correlate positively and significantly on the adoption of action programs and their performance
B	Survey (852 respondents)	A synergetic correlation effect in sustainability, innovation and supply chain integration exists
C	Case-study (5 cases)	For incorporating sustainability in innovations, firms need to strengthen the exploration and exploitation capabilities through enhancing and aligning internal and external incorporation capability
D	Case study (8 cases)	Product-service system innovations for sustainability require all key project members to reconcile their open innovation capabilities or build them collaboratively
E	Case study (12 cases)	User involvement and process cycle may be the main drivers of process disparities when sustainability is incorporated in conventional innovations

THE ACCUMULATION OF SOCIAL CAPITAL IN THE EARLY STAGES AND ITS IMPLICATIONS FOR ENTREPRENEURIAL PERFORMANCES

Butticè Vincenzo – Supervisor: Prof. Chiara Franzoni

In this thesis, by mixing qualitative and quantitative methodologies, I investigate social capital accumulation in the early entrepreneurial stages, both in offline and online contexts, and I study its implication for entrepreneurial performances. First, by conducting a field study of the high end fashion industry, I highlight that entrepreneurs rely on different practices to accumulate social capital. These practices are costly to implement, bear the risk to defocus entrepreneurs from their core business, and occasionally engender stress and dissatisfaction. My results indicate that entrepreneurs often combine two or more practices. While such combination typically fosters the accumulation of social capital, under certain conditions, it may cause drawbacks, which dissipate extant social capital. The field study indicates that contingent events, which get entrepreneurs an extraordinary and often unexpected attention (event-driven attention), influence social capital accumulation. This happens, for instance, when entrepreneurs obtain a prestigious fashion award or when important showrooms select their products for exposure. In these cases, entrepreneurs can exploit a window of opportunity for

accumulating rapidly social capital. However, when entrepreneurs are unable to fulfill the expectations generated by event driven attention, they experience a significant drop of social capital. To investigate how entrepreneurs accumulate social capital in online settings, I study entrepreneur's behaviors in a crowdfunding platform. I argue that crowdfunding gathers a crowd of individuals with shared values (e.g. being supportive towards other crowdfunding users) and allows entrepreneurs to carve out from this crowd a virtual community ready to support them during subsequent crowdfunding campaigns. This community represents entrepreneur's social capital. Following this view, entrepreneurs can accumulate social capital by launching successful crowdfunding campaigns over time. The social capital accumulated through this practice increases the chances of success of the following crowdfunding campaigns. However, it also has its drawbacks. This social capital makes redundant already existing social capital developed within the platform; in other words, it substitutes for other forms of social capital. So, if entrepreneurs already possess a sufficient amount of social capital within

a crowdfunding platform, the additional effect of the social capital originating from their previous successful campaigns is negligible. Moreover, since this type of social capital exists within the particular setting of crowdfunding which offers many alternatives projects to finance daily, it needs to be maintained by launching new campaigns, otherwise it becomes obsolete over time. Accordingly, the positive effect of social capital accumulated by running previous successful campaigns weakens the longer the time since its accumulation. When time elapsed from its accumulation is sufficiently high, I show that social capital developed within the crowdfunding platform vanishes. The accumulation of social capital through the launch subsequent successful crowdfunding campaign, influences offline entrepreneurial performances in several respects. I focus on two main performance indicators: the probability to commercialize the product and the perceived quality of the product by the consumers. I find that projects that accumulated a large amount of social capital during the crowdfunding campaign had on average poorer performance afterwards. The result suggests that social capital attracted during

a crowdfunding campaign may backfire on entrepreneurs. I explain this finding by arguing that crowdfunding immediately throws out to entrepreneurs a challenge, i.e. the management of an unexpected injection of social capital, which is misaligned with entrepreneurs' extant know how. Accordingly, entrepreneurs are not able to manage the extraordinary amount of social capital collected and this likely translates in poorer entrepreneurial performances. Specifically, I showed that when entrepreneurs accumulate conspicuous amount of social capital, the product commercialization may be delayed. In addition, I showed that this social capital offsets the positive effect on product commercialization derived from the financial capital collected. This is because, acquiring social capital so rapidly makes entrepreneurs feel overwhelmed by information, generates frustration and leads them to take sub-optimal decisions. Finally, I showed that having collected a very large amount of social capital reduces the ratings or quality evaluations received later-on by the product. I explain the finding as a drawback of attracting much public attention and scrutiny on the product, including the attention of customers that lie in different market niches and have competing tastes. Inevitably, these would quick devalue the product. Finally, I show that the effects of social capital accumulation on entrepreneurial performances varies depending on the environment where this social

capital is developed. To this aim, I investigated how the effect of social capital developed within the platform varies when controlling for industry specificities. I show that, although internal social capital always has on average a positive correlation with the probability to obtain the funding through a crowdfunding campaign, the magnitude of this effect varies depending on the characteristic of the industry. In particular, internal social capital has a greater effect when the product to be financed belongs to industries characterized by high uncertainty and complexity, such as Technology and Videogames. It has conversely a limited impact on the probability to obtain the funding through a crowdfunding campaign, when the product is characterized by low uncertainty and complexity. I argue that social capital effect is stronger when products belong to complex and uncertain industries, because, in such cases, backers are more prone to interact with entrepreneurs, either to ask for clarification about the entrepreneurial project or to offer suggestions about how to solve specific production problems. Accordingly, stronger ties among backers and the entrepreneur are likely to emerge. In addition, these repeated interactions engender greater social identification with the entrepreneur and favor the raise of embedded relationships within platform. This, ultimately, strengthens the effects of social capital on the probability to get the funding. Interestingly, although the methodology to accumulate

social capital is the same for all the products, the effects on the fundraising depends on the setting in which this social capital is developed. This thesis contributes to extant literature in several respects. The identification of specific practices for accumulating diverse social capital dimensions contributes to the debate on social capital antecedents and advance our knowledge on the entrepreneurial behaviors during the early stages of entrepreneurship. One further contribution to extant research is to underline the cost related to the accumulation and management of social capital. This thesis contributes also to the debate on how environmental conditions affect entrepreneurship in the guise of highlighting that both the dynamics of accumulation of social capital and its implications varies depending on contingent and contextual factors. Finally, with this thesis, I incidentally contribute to the growing literature on crowdfunding. I believe this thesis has important implications for practitioners and policymaker. Policymakers should be aware of these results when they develop new policies to sustain entrepreneurs interested in accumulating social capital. Entrepreneurs may find the findings highlighted in this thesis germane to support social capital accumulation.

SUSTAINABLE SUPPLY CHAIN STRATEGY DEPLOYMENT: ACHIEVING STRATEGIC FIT WITH SUSTAINABILITY

Ciccullo Federica – Supervisor: Prof. Andrea Sianesi

Examples from different industries are nowadays proof of the transition taken by sustainability from being merely a buzzword for green washing purposes to a competitive weapon used to secure a competitive advantage over rival companies (Grosvold et al., 2014). It appears clear that there are many examples of companies positioning themselves on the market as sustainable players, offering environmentally friendly and socially responsible products that are chosen by customers precisely because of these features. The same is true for players who see sustainability as something “to maintain”, that can be taken for granted by customers. In the present thesis, the aim is to approach sustainability through this lens. The perspective is not new in the supply chain strategy literature, but has yet to be broadened to include sustainability. A branch of supply chain management literature indeed advocates that, once order winners and market qualifiers (Hill and Hill, 2009) are fully understood, it will be possible to design and implement consistent interventions in supply chain processes (Aitken et al., 2005). Moreover, literature on supply chain strategy claims that the alignment between customer

requirements and supply chain capabilities is the key to achieving what is known as the supply chain strategic fit (Chopra and Meindl, 2013). Including sustainability in this perspective is at the origins of the overall research objective of this thesis. The study consists of investigating how companies deploy sustainable supply chain strategies, where sustainability is intended as an order winner (OW) and a market qualifier (MQ) as well as a desirable attribute (DA) and in investigating the impact on some contingencies as the supply process instability. We conducted a systematic literature review to confirm the importance of understanding how strategic it is to integrate sustainability within existing supply chain strategies (e.g. the lean and agile ones), because this can determine a different interplay between the various supply chain practices. Using a set of 16 exploratory cross-sectorial case studies and nine explanatory case studies, we observed that companies that see sustainability as an order winner develop a particular and diverse set of capabilities. These are *strategic supply network design change*, *product input stewardship* and *supplier engagement*. Companies

that address sustainability as a market qualifier develop instead capabilities that reflect the goal of building a *sustainable guardianship of the supply base* and *product development stewardship* and are pro-active in facing environmental challenges in production through measure of *pollution prevention*. These capabilities lead to others where sustainability is a desirable (i.e. “nice to have”) attribute: *supplier selection and qualification criteria*, *pollution control*, *sustainable packaging and sustainable logistics solutions*. The logic behind these findings is depicted in Figure 1, where we show the presence of baseline sustainable capabilities and progressively additional ones that are added to the set when sustainability become more strategic (i.e. MQ and OW). We complete the picture by noting that contingencies such as supply process instability are crucial, assuming that the strategic role of sustainability is the same, when choosing between different practices. The contingent effect of supply process instability has been disentangled. We were able to clarify that, when firms for whom sustainability is an OW and they start from a foundation of low process instability, they take actions that could be detrimental for their positioning (i.e. diverting

them to riskier scenarios). Nevertheless, when this happens, companies will also put in place supportive actions (e.g. supplier engagement) to control the induced uncertainty upstream. When, on the contrary, companies experience high instability upstream (due to a structural risk of the industry being related to scarcity of localised raw materials) the strategic supply design changes put in place are capable of mitigating the structural condition of risk. This was the case of two panel manufacturers in the explanatory sample, both of whom opted to implement a circular-type integration, completely changing the materials used in the process and replacing virgin wood with post-use recycled wood. The last part of the work is concerned with proving, through a set of 26 structured interviews, that achieving a strategic fit (i.e. matching customers’ priority with supply chain capabilities)

with sustainability has a positive effect on Triple Bottom Line (TBL) performance. What stands out from this analytical phase is that companies claiming that sustainability is an OW, perform as expected (high impact on external environmental and sustainable performance, as well as on aggregated TBL performance), while this is not necessary true for companies that claimed that sustainability is either an MQ or a DA. There are, on the other hand, companies which asserted that sustainability is a market qualifier, but they are not developing any capabilities. This mismatch is reflected in their poor TBL performance. As a whole, one of our core theoretical contribution lies in the insertion of the strategic perspective in the sustainable supply chain management literature as well as in a further specification and distinction of the capabilities of the Natural Resource Based view theory

(Hart, 1995), linking them with the demand side perspective (i.e. customers’ requirements translated in terms of OW, MQ, DA) of the Resource-Advantage theory (Hunt and Davis, 2008). We believe this study can help managers to devote appropriate resources to the development of sustainable capabilities, in order to reap benefits in environmental and social terms. We also think that the strategic approach of framing sustainability, such as an OW, MQ or DA, can guide choices with a wider and dynamic perspective. If companies are aware that there is a “pyramid”-type interdependence between different sustainable capabilities, this can be useful in a dynamic perspective. Literature teaches us that this year’s order winner is likely to become next year’s market qualifier (Aitken et al., 2005). Managers could be interested in our study in order to understand what additional capabilities to plan in the future as well.

COLLABORATIONS FOR INNOVATION: GOVERNANCE AND POLICY ISSUES

Coletti Michele – Supervisor: Prof. Paolo Landoni

Introduction

Innovation is the result of a collective endeavour, and finding the right partners is key for success. Therefore, collaboration is an innovation generator, especially in cross-sectoral collaborations or when there are knowledge complementarities. However, many Small and Medium Enterprises (SMEs) do not have the resources and absorptive capabilities to collaborate with other organizations. In other words, they do not understand the value of collaboration or know how to manage such relationships. Governments should have policies to increase knowledge and learning in order to stimulate skills development and economic growth. In the last thirty years, many authors have underlined the need for innovation systems, i.e. “networks of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies”. Innovation systems have been declined along several dimensions, but they all share the view that the different parts of a system are interconnected and should work well together. Increased collaborative innovation is a central tenet also in the Open Innovation approach. Innovation policies are meant to solve co-ordination problems that

often arise in complex settings aimed at generating, diffusing and utilizing knowledge and innovation. Scope of this work is to study the main forms of interfirm collaborations for innovation, understand their governance issues, analyse the policies that support these collaborations and identify the factors that maximise their impact.

Typologies of collaborations for innovation & research questions

Public policies increasingly aim at fostering interaction between innovation system components by developing skills, improving opportunities for working together, enhancing technology markets, offering intermediary services and supporting clusters and consortia.

A key distinction for governance of collaborative innovations is between equity and non-equity agreements. Non-equity alliances in which all parties concur to create new knowledge and innovation are called bilateral contractual agreements. This kind of inter-organizational arrangements can generate multi-faceted relationships that support active problem solving and provide access to external knowledge. In other words, they are an instrument of collaborative

innovation and for this reason they have often been a policy target. However, the vast majority of extant literature deals with specific aspects of collaboration, whereas the different forms it can take and the related policies have never been compared.

This piece of research deals with collaborative innovation and related policy instruments, highlighting their most common weaknesses and how they can be addressed. Based on empirical work (collection of papers), this is an attempt to develop a general heuristic of the subject. This study offers an academic contribution as it aims at theory building/organising on collaborations for innovation. Moreover, it is relevant to managers of strategic alliances and policy-makers, that often are ill-equipped on this subject.

Methodology and data

This is a meta-synthesis of empirical research we carried out about the following instruments: creative vouchers to foster innovation between two businesses, governance of small consortia for innovation, technology and industrial clusters. Key dimensions are the number of firms involved (two or three for vouchers, half a dozen for consortia, dozens for clusters) and the focus of policy support (project

for vouchers, firms for consortia, regions for clusters.).

The three pieces of research here consolidated are multi-case studies analysed using different techniques. They all have been presented in IPDM Conferences and are currently under preparation for publication. The meta-synthesis has been presented to Triple Helix and EU-SPRI conferences.

We chose to carry out a meta-synthesis because it brings together qualitative studies to form a new interpretation of the research field. A meta-synthesis is defined as “an exploratory, inductive research to synthesize qualitative case studies for the purpose of making contributions beyond those achieved in the original studies”. The similarities and differences that emerge need to fit into a holistic perspective that should be complete, work, have sufficient scope but at the same time be parsimonious.

Research findings

In our first study, we found that cluster governance is dependent on the nature of the cluster and the presence or absence of leading firms or entrepreneurial universities. Without those, clusters are not likely to succeed. Investigating governance in small consortia for innovation, we found that proximity and complementarity are key factors for success of the collaboration. We also discovered that the administrative committee is involved both in management and orchestration activities and that the latter relies on external supporters.

Studying innovation vouchers, we found that schemes entailing proposal evaluation and supplier qualification achieve high quality of projects and satisfaction rates. This requires policy-makers to adopt a hands-on approach. Collaboration in our definition is an organizational arrangement that uses resources and/or governance structures from more than one existing organization in order to achieve a common purpose. Its governance is the relationship among collaborating organizations providing the structure that decides objectives and determining the mean of achieving them and monitoring performance.

Our studies confirm that collaboration is effective to reach results or engage in projects that otherwise would be impossible for the single firm. Collaboration may not happen due to market or systemic failure. While this justifies a public intervention, our findings show that policies share similar shortcomings: firms tend to use incentives opportunistically and seldom modify their behaviour and innovation trajectories in a lasting way. In other words, collaborative inertia is frequent and government failure more than a remote possibility. Assessing impact of collaboration policies is difficult because money is just a part of what firm receive from such programmes. Access to new knowledge and the experience of collaboration bring invaluable though impalpable learning which is more important than short-term project success. Policy-makers should evaluate programme impact through

aggregate or intangible indicators to avoid policies shaped by political agendas and vested interests.

Contribution to theory and implications for policy

Our study shows that these policies for collaborative innovation are often plagued by two flaws: top-down approaches by the policy makers and opportunistic behaviour by recipients. Non-equity bilateral agreements are effective collaboration forms to foster innovation, but related policies should maximise chances of success identifying the best projects and helping firms to select the more capable partners. We argue that there are three steps to increase the effectiveness of collaboration policies: knowledgeable policy-makers to design programmes and assess outputs; deeper policy evaluations to measure the impact of collaboration programmes; continuity and complementarity of policies as each instrument is effective within a certain scope and no single programme can cover all firm needs. While acquiring a new set of competences, government role should shift from provider/regulator to coordinator/facilitator. Public administrations should not take the place of entrepreneurs, but can be less prescriptive and more entrepreneurial. As a consequence, policy makers and the public opinion should take into account a certain number of failures in publicly-financed programmes in order to learn from experience and to get better outcomes in the longer term.

MULTINATIONAL ENTERPRISES AND ACCESS TO ELECTRICITY IN DEVELOPING COUNTRIES THE CASE OF SUB-SAHARAN AFRICA

D'amelio Matilde – Supervisors: Prof. Paola Garrone, Prof. Lucia Piscitello,
Prof. Emanuela Colombo

In the last years, the world is facing profound and escalating challenges, such as climate changes, enduring poverty of a few countries, inequality at country and global level, internal, cross-border and cross-region migrations. For decades, the most obvious candidates for coping with these global problems were governments and global institutions, such as the United Nations or the World Bank. These institutions do in fact play a role; nevertheless, the Rio+20 summit emphasized the need for a much wider partnership. Among the partners that could act jointly to address these challenges, multinational enterprises (MNEs) are expected to play a key role, as since the seventies they have been growing in size and capabilities. The aim of this thesis is to join this debate and understanding the conditions that make MNEs effective in enhancing the prosperity and well-being of the developing countries where they invest. In doing so, the work addresses the case of sub-Saharan Africa and focuses on a specific dimension of development, access to electricity for local population. Namely, the thesis gauges how economic and institutional conditions of the countries of origin and destination of

MNEs' investments favorite the involvement of MNEs in the provision of electricity to local population, presumably through the construction, maintenance and expansion of infrastructure for the production, transmission and distribution of electricity. In addition, the work studies the outcomes that the involvement of MNEs in the electrification process of developing countries can have on the environment. Finally, it analyzes the motivations of MNEs' engagement in electricity infrastructure projects, and how this affects their performances. For this purposes four papers have been developed, which move from a country (Papers 1,2 and 3) to a firm perspective (Paper 4). The results of this thesis demonstrate that MNEs raise the electrification of developing countries if they operate in contexts with weak formal and informal institutions and come from countries with a similar institutional fragility. The reason could be that managers already developed at home the ability to deal with a challenging institutional environment, over time in a learning-by-doing manner. In addition, this ability could represent a competitive advantage for MNEs from institutionally weak countries, as it can be strategically

exploited to overcome the serious lack of legitimation, whereby these firms generally suffer with their stakeholders. Looking at the stage of economic development of both home and host country, MNEs are found to foster electrification when the host country has reached a certain level of economic development and the home country is poor. Indeed, poor host countries tend to attract mainly MNEs operating in the extractive industry, which develop a private electricity infrastructure. This is difficult to exploit for welfare services due to their specific characteristics (e.g., they are located in remote areas, or the voltage of power grid does not match with national grid requirements). As consequence, host governments, stocked to its budget constraints, are unable to exploit MNEs' presence for public purposes. On the contrary, host countries at a higher stage of economic development attract MNEs from different sectors and are more able to take advantage from their presence. However, by raising the access to electricity in the developing countries where they invest, MNEs from poorer countries raise also the environmental degradation of these countries. The reason could be that these firms still

have a strong technological disadvantage, compared to firms from rich countries, and adopt limited sustainable business practices, as they are constrained by the economic development of their countries of origin. In addition, as MNEs are more effective in raising the access to electricity in countries affected by institutional voids, it is reasonable to assume that even though the host country has reached a certain level of economic development its institutions are still weak and ineffective in implementing strong policies for the protection of the environment. Finally, the thesis shows that, in developing countries, non-market strategies have a large impact on firms' performances. Namely, the implementation of CPA and CSR initiatives is linked to an increase of firm's economic performance, reputation with stakeholders, access to strategic resources and

organizational efficiency. However, except that for the dimension of organizational efficiency, the linkages between firms' performances are statistically more significant with CPA. The strength and novelty of this thesis is that it integrates several debates and contributes to different streams of research. Namely, it contributes to the research on MNEs' impact in host developing countries and their mediating factors; on institutions and provision of collective goods and; on MNEs' legitimation mechanisms. Further, it adds to the research on the environmental consequences of MNEs' presence and economic growth and; research on non-market strategies and their impact on firms' performances. At the same time, this thesis brings important managerial and policy implications for both firms' managers and developing

countries' governments. Indeed, it could provide guidelines to managers of MNEs operating in developing countries, to understand on which country's characteristics they can leverage to stimulate the development of the countries where they invest. Further, it could support managers to gauge benefits coming from the engagement in development initiatives and, to correctly prioritize their stakeholders, based on the performance that the firm wants to maximize. Finally, this thesis can support governments and policy makers of developing countries to create sound policies targeted to attract MNEs that, based on the economic and institutional characteristics of home and host country, can stimulate the energy sector, in an environmental sustainable way, setting the foundations for a long-term and inclusive development of their countries.

EXTREME MANUFACTURING FLEXIBILITY: ORGANIZATIONAL LEVERS TO COPE WITH EXTREME PLANNING, VOLUME AND MIX FLEXIBILITY REQUIREMENTS

Fantino Giorgio – Supervisor: Prof. Giovanni Miragliotta

In a world where the “economics” seem to be everything and all other knowledge fields are in background, where “growth” among all the economic matters seems to be the one and the only one measure of the systems health, where all the economic levers are bent or “disfigured” by the “growth”, where the “speed” of change is always increasing, where, however, even the change does not produce the historical growth rate, where also the time has no value (even a negative value if we translate it in interest rate values), this paper seeks to focus on a medium or long term issue: Is it an advantage to invest in developing soft skills or flexibility through specializations? How can we measure the existing gaps between actual level of knowledge and the possible one? How can we explain or simply understand these gaps not only as actual losses or as future gains? Italian small/medium size companies inherited the larger companies’ knowledge in the past, when these last ones, the large companies, competed worldwide. Nowadays the Italian paradigm seems to shift versus small/medium actors. Italian players seem to find difficulties in bridging from small to large size. In this context, the new actors have to understand and measure

the advantage of investing in distinguished skills of their workers and translate this investment into competitive advantage. We will discuss how this investment was treated by literature, how we can measure the gaps that have to be filled, how these gaps can be seen as the investment we want to afford to reach a better system “status”, how this approach could be reflected in an “on field” study based on a ten-year simulation. This paper is based on the professional experience of its author: a general manager who wanted to drive the change in a typical medium Italian company. A growing company with well-known fashion customers, operating in a partner relationship with these customers, characterized by a negative attitude to change: managers and structure loved the past success tracks and Unions do not want to modify people working habitues. In this context, the Action Research Project, initially imagined, transformed itself in a simulation project useful to define the “efficiency – flexibility” gaps and risks to be covered. The data concerning the last years, 125 thousand records, available from the company system, were considered as statistically relevant

and were subjected to a first series of analysis. These analyses were made with the software Knime. The simulation model was developed on a Software Vensim DSS version 5.9, Ventana System Development, considering a 10-year horizon. The model considers a set of more than 500 variables; many variables are arrays with multidimensional vectors. The base Research Question could be: “How can we measure and judge the effects of new organizational levers on a company structure? How far can we push the system flexibility if we have to consider benefits and costs?” As we present in the following sections, this paper wants to measure the benefits and the related costs that

- 1 more training and educational expenses could have on the structure
- 2 more accurate and fast reacting planning and scheduling could have on the structure

These two areas are investigated through the two following variables:

- 1 the “workers flex” as the ability of the worker to accomplish two or more, different operational tasks
- 2 the “system flex” as the ability of the people in charge of driving the operations to perfectly organize

the single operations in the most efficient and effective way

The proposed target variables useful to measure the effects are:

- 1 “FTE” defined as number of workers, theoretical, employed on a full-time basis necessary to fulfil the demand received, given all the system conditions
- 2 Cost of these FTE
- 3 “LFTE” defined as the number of theoretical equipment lines, given all the system conditions and levers simulated, requested to fulfil the demand received
- 4 Cost of the “LFTE” in terms of space, in squared meters, requested to install the theoretical “fully occupied” lines and the investment cost, based on a standard line cost
- 5 A set of technical indicators able to suggest the system answer in term of hours needed to complete the production process

The paper is based on ICR Spa data. ICR Spa is a typical example of medium size Italian company, working in a well-known sector: luxury and fashion, luxury perfumes in particular. The literature review was initially an introduction to all the arguments that a “change” process pushes to consider: a manager driving a medium size company, especially in Italy, has to drive a “complex” social environment, always changing over the time. The literature review is necessary:

- 1 to know the “state-of-the-art” concerning all or most of the issues influencing the studied environment,
- 2 to restrain the interesting arguments and to focus a research target attainable and useful

3 to understand which aspects of the target are already studied and from which viewpoint

Initially, the project should have to be a real action-research. Nevertheless, as already mentioned, the company immediately dismissed the project because the Unions’ negotiation was so difficult that every proposal was doomed to failure. Not only Unions were negatives, the internal structure was also negative to change. To focus on the simulation, the paper seeks to measure the here-above set of indicators in different scenarios. The company operates or could operate in these different scenarios. The differences between the indicators calculated in these scenarios represent

- 1 the benefits/costs to face if we pass from the first status to the second one
- 2 the theoretical costs affordable if we seek to reach a different status
- 3 the answer of the system to different customers’ request

Two sets of scenarios were ideally built: the first one tried to replicate the real situation along the ten-year horizon; the second wanted to imagine an ideal world where the past was in line with the actual or future conditions. While the first set of hypothesis was used to test the model validity, the second one wanted to inherit the parameters validated to re-build the data series as if everything was produced internally

Professionally, the results were useful during the discussions with the Unions. The main result was the internalization of the outsourced activities with an

agreement with the Unions that cleared all the local past agreements and defined a new workers structure. However, the most important result has not also showed its effects: the new soft skills development as well as the flexibility through specializations could let ICR improve the results or making more efficiency and flexibility with relevant margins. Moreover, this result will push ICR to a second phase with an action research plan on the field; it will prepare the company to face the future customers’ request with an optimized structure. Nevertheless, they could also generalized considering the effect on equipment and technical indicators, analysing the initial conditions and the different future scenarios reachable or imaginable. Many other arguments could be investigate as suggested by the simulation results. For example, the relevance of studying the system model and the consequent managerial style, the mix of structure-people organization- risk that the company really want to put in place, the limits to flexibility in people organization if the approach is pushed to indirect company functions, the limits of training and educational programs applied to workers ... Finally, the author thinks that the paper is a valid suggestion to connect the managerial world with the Accademia to face the ever-new challenges. Could we imagine a series of feedbacks between universities and small or medium size companies that historically did not have a long tradition of educational experience?

THE ROLE OF ORGANIZATIONAL CULTURE IN OPEN INNOVATION ADOPTION: THE CASE OF THE ENERGY EFFICIENCY SECTOR

Franzò Simone – Supervisor: Prof. Federico Frattini

Energy efficiency (EE) is a field that has recently assumed great significance in international public opinion and for policy makers, due to many factors such as the impact on the competitiveness of countries as well as the environmental effects attributable to energy consumption. This has led to the birth of a new industry, i.e. the EE sector, whose core activity refers to the provision of EE services. The preliminary analysis on the *modus operandi* of firms implementing EE projects in Italy shows the strong collaborative nature characterizing the business models of these firms, regardless of the specific business model adopted. The investigation of firms whose core business is the provision of energy services, so-called Energy Service Companies (ESCOs), shows that they adopt the open innovation (OI) principles through establishing partnerships with third parties during the development of their projects, i.e., customers, technology providers and universities. However, there is considerable heterogeneity in terms of the propensity to a collaborative approach of firms offering EE services, even if such an approach would seem to be inherent to their business. This phenomenon can be included in the debate on the difficulties - from a “cultural” perspective - that

firms have in moving from a closed to an OI approach, an issue that is amply discussed in literature and corroborated by much empirical evidence in different sectors. Understanding how organizational culture influences the adoption of OI in firms that implement EE projects is the primary goal of this research. The literature review undertaken enabled us to identify some critical gaps that include: (i) a clear understanding of the role of organizational culture with respect to a firm’s propensity to adopt OI; (ii) a clear understanding of the role of organizational culture with respect to the results of collaborative projects. The phenomenon-driven objective and the state of the current theoretical knowledge on the subject suggested a theory-building research approach to achieve the objective of this thesis. We used a preliminary theoretical framework to orient the empirical analysis by identifying the scope of the research and the main concepts and variables underlying our analysis. This led to the definition of two research questions: RQ1 - *How do the characteristics of the organizational culture influence the degree of openness of firms implementing EE projects?* RQ 2 - *How do the characteristics of the organizational culture influence the results of the EE projects*

implemented collaboratively?

According to the theory-building approach and considering the complexity that characterizes the EE sector, the use of rich qualitative data became of fundamental importance. First, we studied the Italian EE market to select the firms for the empirical analysis. We built a sample of 8 Italian ESCOs, selected based on a “polar types” sampling procedure. Downstream of this first empirical analysis, we formulate the emerging theory, expressed in a series of propositions, that are then tested and refined through a second empirical analysis involving a larger sample of 20 Italian ESCOs.

The multiple case studies led us to define the propositions that represent the emerging theory. It advances that the articulation of the organizational culture of a firm implementing EE projects influences the degree of openness with respect to three main external parties, i.e. technology providers, customers and universities, which in turn affects the success of the collaborative EE projects. Furthermore, our theory suggests that the way in which the cultural variables influence the firm’s degree of openness to external parties is influenced by two main contextual variables, namely,

the size of a firm’s portfolio and the degree of technological maturity of the EE solutions offered. The answers to RQ1 states that: (i) the propensity of firms to use external technologies in implementing EE projects promotes the involvement of technology providers in these projects to complement their know-how and be more attractive on the market; (ii) the risk-taking propensity of firms implementing EE projects characterized by the low technological maturity of their EE solutions portfolio promotes the involvement of customers, since their integration is a mitigation strategy to counter the risks associated with EE projects; (iii) the risk-taking propensity of firms implementing EE projects that have a portfolio with a large number of EE solutions promotes the involvement of technology providers in these projects, since the expected benefits outweigh the associated risks; (iv) the orientation to technological innovation of firms implementing EE projects that have a portfolio with a large number of EE solutions promotes the involvement of technology providers and universities in these projects to offer innovative solutions ahead of competitors; (v) the presence of rituals for rewarding employees who have excelled in collaborative activities in firms implementing EE projects characterized by high propensity to use external technologies and

risk-taking and high orientation to technological innovations promotes the involvement of technology providers, customers and universities in such projects, demonstrating the strategic importance that the firm attributes to the use of external sources of innovation. The answers to RQ2 state that the simultaneous presence of language that tends towards the habits and communication style of the technology providers, universities and customers with whom the firm collaborates in implementing EE projects and an inclusive physical and virtual environment for these parties has a positive effect on the project results, since these facilitate their interactions and internally legitimize the collaborative approach. We believe the work presented in this thesis can benefit above all research in the field of innovation management and organizational culture. First, it adds to the literature on the organizational issues that represent the antecedents of OI and moderate the impact of OI on firms’ performance, by focusing on an under-research issue such as organizational culture. It confirms and reinforces the view in literature according to which the degree of openness to external collaborations of a firm’s innovation process and the results of these collaborative initiatives also depends on the articulation

of a firm’s organizational culture. The study identifies the cultural variables that have the greatest effect on the degree of openness of a firm to external contributions and thereafter on the success of the OI initiatives implemented, while also providing an explanation for this. Moreover, this work also contributes to the literature stream on the performance implications of OI, by adding other performance dimensions to those typically considered in literature and demonstrating the existence of a relationship between the cultural variables and the results of the OI initiatives. Finally, this work also contributes to the literature on organizational culture, by adding to what is known about the relationship between organizational culture and innovation, with particular reference to a specific approach to innovation, i.e. OI. The research provides several insights for top and middle managers of EE companies willing to promote the adoption of OI in their firms. The theoretical model developed enables managers to recognize the importance of cultural variables on the propensity of firms to adopt OI and the results of such initiatives and provides some concrete suggestions to managers on how to act on the organizational culture of their firms to increase the firm’s propensity towards OI and facilitate the achievement of positive results.

UNIVERSITY KNOWLEDGE AND ENTREPRENEURSHIP: HOW LOCAL FACTORS SHAPE THE CONVERSION OF UNIVERSITY KNOWLEDGE SPILLOVERS INTO ECONOMICALLY USEFUL KNOWLEDGE

Ghio Niccolò – Supervisor: Prof. Massimiliano Guerini

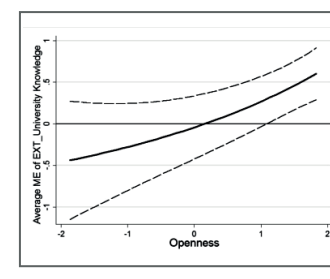
In the last decades, the issue of whether and how universities influence the local economic context has received increasing attention from both academics and policy-makers. By pursuing the so-called “third mission”, universities can affect innovation and economic performance of local territories, thus increasing their competitiveness (Etzkowitz, 1998; Etzkowitz and Leydesdorff, 2000). The present thesis enters in this wide debate, by investigating the role of university knowledge spillovers in shaping the economic activities (Varga 2000; Feldman and Desrochers, 2003; Audretsch and Lehmann, 2005; Mueller, 2006; Carlsson et al., 2009; Belenzon and Schankerman, 2013). Business opportunities stemming from university knowledge spillovers require an industrialization process requiring considerable effort and costs (Bercovitz and Feldman, 2006) in order to be shaped into marketable applications by external economic agents (Fontes, 2005; Mueller, 2006). According to recent articles, the phenomenon of new firm creation is a suitable mechanism to transfer university knowledge to the economic environment (Audretsch and Lehmann, 2005; Acosta et al., 2011; Bonaccorsi et al., 2014) as prospective entrepreneurs

are more willing to invest in the development and commercial exploitation of products and services out of university knowledge spillovers (Acs et al., 2013) than incumbent firms. However, such contributions often lack a common theoretical framework, and our understanding on the topic is far from being exhaustive (see Qian and Acs, 2013). The present research project aims at address this gap, by providing theoretical and empirical contribution to the study of the dynamics underlying the creation of new firms, established to commercialize university knowledge spillovers. More specifically, it intends to answer two overarching research questions: i) What do we know about the role of university knowledge spillovers in fostering entrepreneurship? ii) Which are the local factors that facilitate/hamper the conversion of university knowledge into economic knowledge through the creation of new firms?. By answering to the first research question, the first objective of the present research project is to offer a theoretical contribution, which consists in the systematization of the academic literature that have investigated the effect of university knowledge spillovers

in fostering the creation of new firms at the local level. Then, by answering to the second research question, this thesis intends to investigate how specific local factors are able to influence such phenomenon. More specifically, I aim at analyze the mechanisms through which the characteristics of the local economic context allow certain geographical areas to experience superior performance in entrepreneurial activities, which base their competitive advantage on the commercial exploitation of university knowledge spillovers.

The output

The first contribution of the present thesis, by providing a systematization of the literature investigating the role of university knowledge spillovers in fostering local entrepreneurship, lies in positioning of the Knowledge Spillover Theory of Entrepreneurship (KSTE) against pre-existing theories. In particular, it identifies the KSTE as the academic literature of entrepreneurship that clarifies how the newly-created knowledge affects the economic context. Furthermore, this work analyzes the extent to which the characteristics of geographical areas influence the creation of new firms that are established to commercialize university



1. Marginal effect of external university knowledge, as OPENNESS varies

knowledge. In so doing, it shows that local population's open-minded attitudes and the local presence of financial

intermediaries able to establish trust-based relationships with their borrowers are crucial determinants in increasing the permeability of the local knowledge filter. In this view, the second contribution of the present work consist in providing evidence to the fact that open-minded attitudes of population in local areas, by lowering the communication barriers and facilitating the income of talented people, are fundamental in the capture and commercial exploitation of knowledge spillovers generated by geographically distant universities.

The third contribution of the present thesis consists in the recognition of the availability of cooperative banks in local areas as a crucial determinant of the degree to which geographical areas experience superior performance in entrepreneurial activities aimed to commercially exploit university knowledge spillovers. In particular, cooperative banks lower the difficulties hampering the access to external funds, when perspective entrepreneurs have to deal with the industrialization process of scientific discoveries deriving from university knowledge.

TABLE 1. MARGINAL EFFECT OF UNIVERSITY KNOWLEDGE, FOR DIFFERENT VALUES OF LOCAL OPPORTUNISM AND PRESENCE OF COOPERATIVE BANKS.

		ME of UNIKNOW _{i,j} when COOPERATIVE _j is:		
		1 std. dev. below the mean value	at its mean value	1 std. dev. above the mean value
ME of UNIKNOW _{i,j} when OPPORTUNISM _j is:	1 std. dev. above the mean value	NS	1.447***	4.060***
	at its mean value	0.581**	0.956***	1.321***
	1 std. dev. below the mean value	1.603***	NS	NS

NS: not significant. The asterisks ** and *** indicate significance at the 5%, and 1% level, respectively.

THE ROLE OF ORGANIZATIONAL CULTURE IN OPEN INNOVATION ADOPTION: THE CASE OF THE ENERGY EFFICIENCY SECTOR

Grassi Laura – Supervisor: Prof. Marco Giorgino

The research context of this work is corporate governance, which essentially deals with effective control mechanisms to avoid that the different interests in a company could lead to misbehaviours.

It became more and more relevant also as a consequence of recent defaults, financial frauds like the Italian Cirio and Parmalat scandals and the 2000s financial crisis, where many cases of inadequate governance displays.

Considering the agency problems arising from the separation of ownership and control, prior literature tended to identify possible mechanisms through which reducing information asymmetries and better aligning the interests of shareholders (principal) and managers (agent). Among different mitigation issues, this work focuses on board composition and in particular on board heterogeneity.

The board of directors is ultimately responsible for the success of

a firm as the way in which the board performs its tasks is directly linked to firm performance, as it exerts a remarkable role with business and strategic implications and monitoring of the company management.

Building on an extended literature review, the primary idea of this project derives from the consideration that extant research has not evidenced in sufficient detail how the board heterogeneity has influenced subsequent performances of the company and the effectiveness of governance mechanisms. The limited number of academic studies on a subset of the heterogeneity issues provides contradictory results.

In addition, no study analyses what happens as soon as a very heterogeneous board is appointed. Despite positive contributions of directors heterogeneity, such as better quality of new ideas and debate, possible communication problems could arise. Research is still scarce on proper mechanisms

to make heterogeneous directors converge, without wasting time and/or reducing their contribution. Further, besides heterogeneity could be beneficial for a company, it can also improve the attractiveness of the company towards institutional investors, which are minority investors but also proper and skilled monitors.

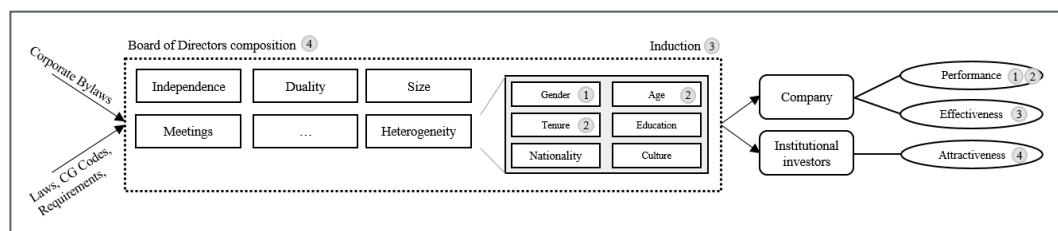
The thesis comprehends four different but interrelated papers whose connections are highlighted in the Research Framework reported in Fig.1. Namely, Paper 1 focuses on the over and large debated gender issue in the boardroom on company performance, but considering the positions that female directors hold in the board. Results showed that not all the female directors influence firm performance, as it acquires relevance the role they hold. In particular, we found that female executive directors and chairwoman impact negatively subsequent firm performance

while female non-executive non-independent members do not influence it. These findings could support the idea that these nominations act as a token in the boardroom. The presence of female independent directors instead increases subsequent performance, as they act as better monitors of managers.

Paper 2 analyses the impact of tenured directors on subsequent company performance, even in relation to other main issues such as gender, independence and size. Research on tenure of directors is in an embryonic state. Considering a sample of major European listed companies on a four years base, accordingly to the role of directors as advisors and monitors of managers, we find consistent and robust results that firms with tenured directors have better subsequent company performances following a U-shaped relation. Similarly, the presence of tenured independent and female independent members is beneficial for the company. Paper 3 considers induction of directors as a possible mechanism to improve effectiveness of governance. At least at their appointment, directors do face a strong lack of information about the company business and environment. Induction programs should facilitate the knowledge of the environment, combining the different expertise of the directors. This is even more important when such directors are heterogeneous along different dimensions, in order to have directors ready for facing their offices in the shortest possible time. Results show that induction programs are a

fundamental tool to assure that each director fully contributes with his own human and social capital to the board meetings in the shortest possible time, thus guaranteeing a positive impact on the value creation. Cases showed that the strict centrality of the company business leads to a company-customization considering the peculiarities of the directors of the company and in particular their pre-requisites both at an individual and at a collegial level. Among the main benefits of such sessions, we noticed the fostering of debate and discussion and the improvement of cohesion among board members. Finally, Paper 4 considers institutional investors as minority shareholders, questioning whether governance practices drive their investment decisions and whether country-level protection variables can act as substitute to some extent. Empirical evidence suggests that governance practices are significant in driving investment decisions and that investors appreciate lean but sound systems, which enable fast decisions, hedging investors from information asymmetry and the risk of wealth expropriation. Additionally, firm-level and country-level protection are to some extent substitutable. In fact, in countries where the protection of minority investors is lower, institutional investors assign greater importance to sound and less to lean governance systems. By contrast, in countries where minority investors are more protected. Summing up, these results advance the literature on the

effects of the heterogeneity of boards in several ways. First, we extend the comprehension of the effect of female directors on firm performance by considering also the role they have. Further, we show that directors tenure, a board characteristic which received limited attention, is an important dimension of advising and monitoring. Third, induction has not yet received the attention it deserves in the light of its implications and beneficial effect we documented. Finally, findings show that governance provisions do affect institutional investors effects, identifying *leanness* and *soundness* governance variables and highlighting some substitutional effect with legal protection of minorities at country level.



1. Research Framework

SUSTAINABILITY IN THE FOOD SUPPLY CHAIN SEEN FROM A MULTIPLE STAGES' PERSPECTIVE A STUDY OF SUSTAINABILITY PRACTICES, COLLABORATION, ASSESSMENT AND PERFORMANCE IN THE ITALIAN FOOD SUPPLY CHAIN

León-Bravo Verónica – Supervisor: Prof. Andrea Sianesi

Research Objectives and Methodology

The thesis comprises five papers to study the food supply chain (FSC) and in particular, the sustainable performance management in different FSC stages. Given that organizations are part of a network of interdependencies and need resources from supply chain partners to get performance benefits, reduce uncertainties and increase power, the Resource Dependence Theory (RDT) provides a frame for designing the study and interpreting the results. The research goes along three phases:

Delimiting, systematic literature review (Paper 1) to identify the gaps in literature and to define the research objectives: 1) to identify sustainability practices in different FSC stages. 2) to investigate how sustainability practices are associated to performance in the company and in the upstream or downstream. 3) to investigate the implications of different FSC stages' sustainability behavior; and, 4) to investigate how sustainability assessment is carried out, if it is, in different FSC stages. Exploratory, multiple case studies spread on four different stages: grower/breeder, processor, distributor/transport, and retailer; analyzing sustainability practices in the FSC, performance

pursued, links with performance in other parts of the chain, and sustainability assessment (Paper 2, Paper 3).

Explanatory, multiple case studies concentrated on specific product supply chains: in Paper 4, the Grana Padano and in Paper 5, the Italian pasta.

In the exploratory and explanatory phases, each paper considers particular research questions, and number of FSC stages. The unit of analysis is the company with activities in a particular stage. Cases were a variety of small and larger companies.

Data was collected via semi-structured interviews, direct observation, and from secondary data. An interview protocol was developed a priori and was refined and updated as interviews went along. Data analysis was performed in three levels: within case, cross-case and cross-stage. Construct validity was ensured by using multiple sources of evidence, establishing a chain of evidence, with structured data analysis and triangulation, and using a replication logic. Lastly, operationalization and an interview protocol helped to maximize reliability.

Main findings

In the exploratory phase, a preliminary understanding of

variables in a particular FSC stage and the effects on the upstream and downstream was observed. Sustainability practices' implementation depends on the FSC stage, company size, level of vertical integration and product typology. Conforming to RDT, these behaviors could cause new dependences in the future, as the performance dimensions attempted in different stages could contrast with the ones upstream and downstream, it could cause misalignments and rival objectives in the chain. Findings in this phase called for further examination in a more homogeneous set of cases. In the explanatory phase, Paper 5 provided more detail of the links between sustainability collaboration and performances, confirming or diverging the findings in the previous phase. The behaviors observed in Paper 5 could be explained by RDT, as the collaborative strategies imply consequences not clearly assimilated, and new dependences call for revised relationships to improve performances. On the other hand, the cases in Paper 4 allowed exploring the rationale behind sustainability assessment in the FSC thanks to the product' regulated environment. Findings also provided insights about

the alignment between drivers, practices and performance. The results evidenced that the sustainability approach in the FSC is shaped by the combination of sustainability practices implemented, the performances pursued and the assessment mechanisms. The approach in each stage is influenced by company size, the supply chain stage, the role of the company in the chain, the level of vertical integration and the sustainability strategy.

Discussion and Conclusions

Together with the findings, the main messages from this research involve interdependence, and, research design choices. Regarding interdependence, the implementation of certain sustainability practices in a certain stage implies consequences internally and on other actors in the chain. The interdependence is shaped by companies' size, level of vertical integration, role in the chain, and supply chain stage; driving each stage's sustainability approach, and requiring them to assess sustainability. However, different FSC stages might not realize this need yet. Moreover, companies already assessing are not aware of how the interdependences will be reshaped or created when other stages require new information or actions.

In the other hand, the multi-stage research design implied collecting data from multiple tiers to analyze behaviors that otherwise could not be observed, and at the same time, capturing the intrinsic heterogeneity in food

industry. Although innovative in sustainable supply chain research, this multi-tier case study methodology was challenging due to the time and resources needed to approach firms in different FSC stages. Furthermore, while studying multiple FSC stages, it was possible to recognize the factors influencing sustainability implementation and assessment. These factors trigger behaviors that at the same time shape the interdependences in the chain; hence, adopting RDT is a novelty too.

Implications for theory and practice

Findings in this thesis contribute to theory by identifying different sustainability approaches in different FSC stages, and, by identifying the factors that influence practices implementation and assessment. Furthermore, it contributes and extends theory on the sustainability assessment rationale, suggesting that alignment, though not perfect, is achieved either in the vertically integrated cases, or in those strongly coordinated, where the presence of an overseeing body provides better alignment. In addition, this research extends and confirms the interdependence in the FSC, where increased collaboration to deal with external pressures and uncertainties is suggested, according to RDT. This study extend this idea by studying multiple FSC stages. Findings in this study contribute to practice mainly in two areas. First, to raise awareness of the interdependences, to comprehend

other stage's objectives and to look for more aligned sustainability goals. Second, the alignment of sustainability assessment in the FSC that up to now exhibits an individualistic approach and the chain does not know how to deal with the interdependences created by individual behaviors. Once managers recognize the diversity of practices and objectives, assessment could take a completely new approach.

Limitations and future research ideas

First, the study focuses in one industry, in a country, and product based on the researcher's criteria; thus, further research is encouraged to study other scenarios. Second, the multi-stage research design is innovative, though, it should be carefully considered, as the broader the study becomes, the more challenging will be to involve multiple stages. Third, the rationale for sustainability assessment is an initial step opening an extensive avenue for research, e.g., if the practices implemented are useful to attain the performances intended, and if not, how companies make sure they measure what is appropriate. Lastly, the study did not consider standardized reporting systems, since small and medium companies compose food industry in Italy, and they are not particularly engaged in these systems. Future research could focus on reporting systems, certifications and policies, the role of non-profit organizations and the role of trading actors.

SUPPLY CHAIN PERFORMANCE MEASUREMENT SYSTEMS: A LIFECYCLE PERSPECTIVE ON THE RELATIONSHIP WITH PERFORMANCE IMPROVEMENT

Maestrini Vieri – Supervisors: Prof. Federico Caniato, Prof. Paolo Maccarrone

Many industries in the last decades have undergone massive outsourcing and offshoring, leading to a condition where SC partners contribute significantly to the company value creation. On this behalf, starting from almost two decades ago, some authors claimed that companies are facing a SC based competition scenario. While instances of head-to-head competition within each SC tier are limited, the essence of SC based competition are companies competing and winning thanks to the capabilities they can assemble across their SC networks. On this behalf SCPMSs are instrumental, extending management control beyond the boundaries of the company: SCPMS allows to control, to orchestrate and to stimulate SC partners towards continuous improvement, as well as to manage risk through an extended visibility. For these reasons, SCPMSs appear more a need than a challenge for many companies. After almost twenty years, the scientific community attention on the topic has not decreased and SCPMS still represents a challenge for both performance measurement and management and supply chain management scholars. Despite quite an extensive and heterogeneous literature, SCPMS

still appears as an often discussed but rarely defined topic, whose boundaries are rather fuzzy. On the one hand, authors refer to SCPMS addressing diverse units of analysis for the measurement process: suppliers, customers, logistics and/or internal production operations. On the other hand, different labels are adopted (e.g. supplier PMS - SPMS, vendor rating, relationship PMS), which partially overlapped with SCPMS, contributing to increase the entropy of the concept. As a result, a comprehensive overview of the topic along with clear definitions is still lacking. Another element worth noting is that, notwithstanding the unit of analysis of the measurement process (SC partners, SC processes/relationships, internal SC-related activities etc.), most contributions are focused on the SCPMS design. This means that authors focused their attention on the “what to measure” issue, while the other phases of the SCPMS lifecycle, i.e. SCPMS implementation, use and review, have been largely neglected so far. Moreover, despite the emphasis on how to develop the measurement framework, empirical evidence on the outcomes from the SCPMS adoption is lacking. Grounding on previous

considerations, my PhD research has two main high-level goals: (1) shed lights on the concept of SCPMSs, providing a comprehensive explanatory framework. (2) Empirically investigate the relationship between SCPMS adoption and performance improvement. The thesis is structured as a collection of five papers, which can be classified into three consecutive logical phases.

1. Research perimeter definition (paper 1): it represents the preliminary phase of the research, directly tackling the first goal. The scope of the analysis is clarified and relevant definitions and constructs are addressed. The aim is to disentangle the complex topic, by rationalizing extant literature and listing main issues to consider.
2. Critical issues identification (paper 2): first steps into the field, within an initial empirical investigation based on theory building SC case study, aimed at gaining preliminary insights about the second goal of the research, i.e. the SCPMS outcomes and impact on performance.
3. Specific problem outline (paper 3-4-5): the core part of the doctoral research, aimed at addressing with a

theory testing approach the relationship between SCPMS (and supplier PMS in particular) and SC partners' performance (suppliers in particular). These last three papers, along with the second one are aimed at achieving the second goal of the PhD research.

The first paper is a purely conceptual paper, aimed at clarifying the concept of SCPMS and setting the boundaries of the topic; a systematic literature approach is applied with three goals: (1) clarifying the boundaries of the topic and providing relevant definitions; (2) assessing the current state of the art of extant scientific literature; (3) propose a research agenda for future. The second paper is based on a theory building research, based on a case study methodology and a qualitative approach in data analysis. It is important to note that it is a single SC case study, involving 7 companies within three tiers of the automotive SC. The paper aims at overcoming two main limitations of extant literature: the focus on the design phase and the lack of evidence about SCPMS effectiveness perception. Thus, the paper has a twofold purpose: (1) highlighting the SCPMS benefits and criticalities, collecting opinions from all the actors

involved; (2) applying a SCPMS lifecycle perspective looking how it is possible to leverage on various lifecycle phases (design, implementation, use, review), in order to solve criticalities and maximise the tool effectiveness. The last three papers aim at analysing the path between PMS adoption and performance improvement with a theory testing approach. The focus is on supplier PMS (SPMS), the most common type of SCPMS, suitable to be addressed by means of a survey based research within a quantitative approach for data analysis. Dataset for paper 3-4 comes from a dyadic buyer-supplier survey project; the final empirical sample consists in 147 dyads. The theoretical ground relies in the Resource Orchestration Theory (ROT). The former develops constructs assessing the maturity of each phase of the SPMS lifecycle (i.e. SPMS design maturity, SPMS implementation maturity, SPMS use maturity, SPMS review maturity) and tests the relationship with supplier performance improvement. The latter further digs into the SPMS use, analysing the impact of the two paradigms (interactive and diagnostic) of SPMS use and their combined effect (dynamic tension) on supplier's performance. The

mediation effect of relationship trust is recognized. The fifth and last paper insists on the same relationship but applies different theoretical lenses, i.e. agency theory and constructs change consistently. Monitoring and incentives have been considered as two primary supplier performance management practices. An agency path between monitoring/incentives and supplier performance is identified, identifying the mediation effect of goal congruence and supplier opportunism. The Dataset for the fifth paper comes from the second round of the International Purchasing Survey (IPS2), an international research project about purchasing strategies, practices and performance involving four European Institutions. I was in charge of coordinating the data collection in Italy.

STRATEGIC INVESTMENT DECISIONS IN THE ENERGY SUPPLY AND DEMAND SECTORS UNDER UNCERTAIN TECHNICAL CHANGE AND SUSTAINABILITY CONCERNS

Marangoni Giacomo – Supervisor: Prof. Massimo Tavoni

As the scientific community develops clearer prospects on the global risks that current rates of climate change may pose to human welfare, policy-makers are faced with the responsibility to either hedge against these risks today, or adopt a wait-and-see approach. While governments started to acknowledge anthropogenic climate change and the need for action 20 years ago with the first Earth Summit conference, a certain inertia followed from the expectations of strong economic repercussions along with emissions mitigation, especially at the deep levels required for limiting warming to safe thresholds. According to the climate scientists, global atmospheric temperature increase should not exceed two degrees Celsius with respect to pre-industrial levels in order to avoid irreversible climate damages. How to turn these century-long future ambitious goals in decisions for today? Climate scientists and economists help informing these decisions by resorting to so called Integrated Assessment Models (IAMs). IAMs have been proved to be a useful tool in exploring the possibility space of future sustainable energy systems, and identifying the most-effective options, as

extensively reported in the mitigation chapters on assessing transformation pathways of the fifth IPCC Assessment Report. These models employ numerical optimization or simulation methods to provide economic assessments of climate change policies, and propose ideal pathways to decarbonize our economies. These pathways usually envisage a deep and potentially very costly transformation of the energy system, which is the main source of anthropogenic GHG emissions, one of the main driver of recent global warming according to IPCC. Two key strategies emerge from the research of this and previous studies, if we want to contain the cost of decarbonization: improving energy efficiency, and reducing the costs of low-carbon technologies. Both of these strategies involve some form of innovation, either in producing or consuming energy. Including innovation in the quantitative assessment of climate policy options has been challenging, especially considering uncertainty in future technological change and socio-economic contexts, complexity of interactions between economic-energy sectors and between regions, unoptimal behavioral aspects of energy demand, current fragmented

national policy commitments and future stringent environmental constraints. Starting with the energy-demand side, chapter 2 of this thesis investigates the role of energy efficiency improvements in affecting baseline emissions. The analysis takes also into account interactions with changes in other important factors across meaningful future scenario alternatives. As reduction of energy intensity turns out to be among the key drivers of unconstrained CO₂ emissions, it is worth exploring what mitigation options are available in this sector due to innovative technologies. Chapter 3 casts some light on the potential of energy conservation from the digitalization of the residential power sector. Smart-meters, consumption tracking devices and demand response programmes resulting from this information are becoming more and more common among utilities R&D agenda. In particular, we focus on the impact evaluation of a real-time feedback in-home display deployed in Italy. Passing from a microeconomic to a macroeconomic perspective, Chapter 4 quantifies optimal public R&D expenditures in energy efficiency improvements compatible with an ambitious 2 degrees climate stabilization

target. This channel of innovation is juxtaposed with one in a breakthrough clean non-electric technology. This starts our exploration of the innovation possibilities in the energy supply side. Chapter 5 involves a wider set of technologies subject to potential future R&D attention, and questions the role of their future uncertain progress in emissions and mitigation costs. Chapter 6 concludes by considering the joint problem of finding optimal R&D investments and the uncertain technical change resulting from them. Table 1 highlights some of the features characterizing each chapter. Climate policy makers, clean energy investors and power operators will find relevant insights on optimal clean energy R&D investment portfolios, best R&D risk-hedging strategies, and smart-meter potential for emission reductions. The contribution of this Ph.D. thesis lies at the intersection of these topics. The combination of novel and robust methodologies will hopefully be of inspiration for the design of improved strategies to prepare the ground for future stringent climate stabilization.

	CHAPTER 2	CHAPTER 3	CHAPTER 4	CHAPTER 5	CHAPTER 6
<i>Sensitivity of projected long-term CO₂ emissions across the Shared Socio-economic Pathways</i>					
<i>Real-time feedback on electricity consumption: evidence from a field experiment in Italy</i>					
<i>The clean energy R&D strategy for 2°C</i>					
<i>Sensitivity to Energy Technology Costs: a multi-model comparison analysis</i>					
<i>Optimal Clean Energy R&D Investments Under Uncertainty</i>					
Innovation in					
Energy efficiency					
Advanced biofuels					
Batteries for personal transport					
Solar					
Bio-electricity					
Nuclear					
CCS					
Methods					
IAM					
Sensitivity analysis on ensemble of IAMs					
Experts' elicitation					
Empirical analysis (regression and clustering)					
Approximate dynamic programming					
Climate policy					
Baseline					
Copenhagen pledges					
2°C					
Insights on					
Key drivers of uncertainty					
Impact evaluation of behavioural programmes					
Assessment of public R&D portfolios					
Novel methodologies					

Caption for Table 1 (10cm x 15cm) Summary of features included in the research of each chapter

ESSAYS ON SOCIAL IMPACT INVESTMENT: ADOPTION AND EVOLUTION OUTSIDE ANGLO-SAXON COUNTRIES

Michelucci Fania Valeria – Supervisor: Prof. Mario Calderini

This thesis is a collection of four essays aimed to add an original contribution to theory and practice through the analysis of the practices in the Social Impact Investment marketplace. Social Impact Investment is a strategy of asset allocation in which expectations of financial and social returns are blended together in a unique value proposition. At now, the studies have focused largely on the adoption and evolution of this practice in the Anglo-Saxon countries. Currently, the Anglo-Saxon model of Social Impact Investment has been criticized for the excessive inference of the government that exerts its power by establishing what social investees should be and do, the neoliberal policy discourse that surrounds the practice, and its social genuineness. The argument sustained in this collection is that the path dependency of history, culture, institutional forces and the differences of the welfare states might cause a variation in the way in which the Social Impact Investment marketplace develops in different institutional contexts. Thus, moving from the critics, the essays challenge the established paradigm and support the idea that, even if the Anglo-Saxon countries are usually pinpointed as a model, different alternatives

of building a Social Impact Investment marketplace can exist. Moreover, this research builds upon the calls of scholars for segmenting the field in different practices, models and needs. Specifically, the research theorizes the contextual conditions and the actors that play an enabling function for the development of the Social Impact Investment marketplace in the Anglo-Saxon paradigm. Once these characteristics have been defined (in paper 1), the thesis proceeds by analyzing the cases where they are absent, with the aim to study the on-going practices and theorize alternatives models. In doing so, the thesis elaborates a rich and original description of the Italian Social Impact Investment market, proposing the roles that organizations can play in the absence of market enablers and the market configurations that results from their interactions (paper 2); the drivers that influence the Social Impact Investment decisions outside the paradigmatic context and the strategies that result from their combination (paper 3); the role of conflicts and barriers in developing the Social Impact Investment ecosystems (paper 4). III This thesis demonstrated that even if the market enablers fail

to be present, it does not prevent the adoption and development of Social Impact Investments, but the market actors find several difficulties especially because of the lack of connection and intermediation in the market. The dearth of targeted public policies is only partially compensated by the private initiative and the lack of regulation, connection and public stewardship leaves space to uncoordinated and experimental small pilots. Some of them toil to be proper a Social Impact Investment and still conserve a charitable imprint. Nevertheless, there are also more audacious cases, which have properly the form of profitable investments. To compensate the lack of market enablers, the practice assumes a networked style, involving a larger group of organizations, which share competences and risks and experiment a superior degree of flexibility. As a result, the social embedded nature of organizations can act as an enabler in the start-up of Social Impact Investment initiatives and partners' selection. Moreover, this thesis finds out that while some factors are relevant to the adoption and development of Social Impact Investment in the road runners countries (i.e.: the possibility to benefit from market incentives

and public funding), they have a limited relevance in other contexts, where the private initiative is encouraged by different drivers, both financial and non-financial. The external pressures exerted by non-profit organizations, professional networks and working groups, the achievement of a first mover advantage, the financial attractiveness, the envisage of a segment of unserved demand and reputational reasons are all important factors that drive the decision when market enablers are absent. Depending on the prevalent drivers, organizations use Social Impact Investments

for different strategies: for their financial stability or competitive returns, with the intent to achieve a first mover advantage in a profitable segment of unserved demand; for those companies that come to the world with a blended mission, it is a way to achieve their social and financial objectives; for the organizations that are driven mainly by external pressures and reputational aim, it is mainly an instrument to send a positive signal to the market and achieve external legitimation. Finally, this research identifies the conflicts that arise when organization collaborate to set a Social Impact Investment

initiative and a typology of managerial strategies to cope with them, namely the reduction of formalism, the use of facts to compensate the difficulties of accounting the social outcomes and the mediation between views by allocating organizations to different sub-tasks. IV Theoretically, the collection is rooted in the prior research in the field and also builds upon consolidated theoretical frameworks, such as network theory and institutional theory. It concludes with the limitations of the studies, the relevance for professionals and academicians and paths for further research.

ORGANIZING PROJECT-BASED OPERATIONS: THE INTERPLAY OF CONTENT, CONTEXT AND LATERAL PROCESSES

Miterev Maksim – Supervisor: Prof. Mauro Mancini

Problematization

Project-based organizations (PBOs) are becoming increasingly widespread and important for the modern economy and society, attracting significant scholarly attention to their distinctive features. The unit of analysis employed by the majority of the studies is the PBO as a whole. The locus of attention stays at the organizational level, whereas project-related effects are discussed in terms of aggregate properties. With very few exceptions, projects as distinct entities do not feature prominently in the discussion on PBOs. This observation creates an interesting paradox. In particular, when projects are discussed as separate units of analysis, their complex organizational dynamics, idiosyncrasies, and institutional embeddedness are among important loci of attention. However, when projects and project collections are discussed within the context of the PBO, the very same factors tend to be downplayed. Most commonly, projects are either neglected or implicitly assumed to be homogeneous, interchangeable atomic units without internal structure or dynamics, obediently following orders of the parent organizations. Their internal organizational properties are overlooked and the individual level

variables are assumed to have little or no influence on the project outcomes. This thesis questions these assumptions and posits that understanding the dynamics at the project operations level might have important implications for explaining the effectiveness of management arrangements in the PBO.

Research purpose and the RQ

The overall purpose of this thesis is to explore the factors which affect organizing of project-based operations in the context of the PBO. In order to fulfil the purpose, the thesis investigates the following overarching research question: How are project-based operations shaped in the context of the project-based organization? The thesis examines three particular factors which affect organizing of the project-based operations: (1) the content of operations; (2) the context of operations; and (3) the lateral social processes at the operational level.

Methodology

Largely inductive in nature, the thesis builds on two research studies. The first one represents an in-depth ‘insider’ case study of project-based operations in the Operations division of a large pharmaceutical company. It employs a combination of data

collection methods, including semi-structured interviews, participant observations, and document analysis. The second study represents a structured framework-based literature review. Recognizing organizational properties of projects, the thesis draws upon several literature streams within organization theory and design to analyze the empirical data.

Key findings

Structurally, the thesis comprises a cover essay and four appended papers (three of them accepted for publication in international peer-reviewed journals). The papers are presented in the Table 1.

Paper I – The findings suggest that various program settings place distinctively different demands on program managers. Building on a popular program typology, the study develops a contingency competence model that link specific competence profiles (Coordinator, Commander and Convincer) to different program types.

Paper II – The findings suggest that projects tend to ‘imitate’ each other’s structures, strategies and practices with little consideration of potential performance effects. The study inductively identifies a set of mechanisms that contribute to the isomorphism among projects in the PBO and links each of them to specific aspects of project

organization design.

Paper III – The paper illustrates how the organization design lens can represent a valuable research perspective on the PBO. The study develops a research framework to map current themes in the literature and their relative importance, identifies the gaps and discusses a future research agenda.

Paper IV – Building on the organization theory and design literature the paper argues for a contingency approach to the design of the PBO. It develops a model for the design of the PBO by identifying the contingency factors that affect the PBO design and adapting the Galbraith’s Star Model to reflect those.

Building on these paper-specific results, the cover essay synthesizes them at a higher level of abstraction to achieve the aim of the thesis. Overall, the results elaborate how the organizing of project-based

operations in the PBO is shaped by the interplay between the content, organizational and institutional context, as well as lateral social processes.

Theoretical implications

The thesis contributes to the literature on PBOs by developing an institutional and extending a contingency perspective on organizing project-based operations. Further, the results call for revisiting the conceptualization of the PBO by questioning the view of projects as atomic and homogeneous units. Finally, the thesis contributes to the literature by developing an organization design perspective on the PBO.

Practical implications

In terms of implications for practice, the thesis offers few frameworks which can be used to support managerial decisions in a PBO. In particular, Paper I develops a contingency model of program

management competences (the 3C model), while Paper IV puts forth an organization design model for the PBO. At a more general level, Paper II identifies a set of mechanisms that might lead to a low variability in various aspects of project organization design. It also discusses how the identified isomorphic processes might be limiting such organizational properties of PBOs as flexibility, innovation and efficiency. In turn, Paper III draws attention to the interplay between various organization design dimensions in the PBO and provides a framework that could be used as a starting point in the discussion of specific organization design choices in the PBO.

Overall, the thesis raises awareness of reflective practitioners about the factors that might shape project-based operations and which should be taken into account during the organizational redesign endeavours.

TABLE 1. OVERVIEW OF THE PAPERS INCLUDED IN THE THESIS

Title	Key contribution	Research outlet
“Exploring program management competences for various program types”	Challenges the ‘one-size-fits-all’ assumption in the literature and develops a contingency model of program management competences (the 3C model)	Accepted in the <i>International Journal of Project Management</i>
“Mechanisms of isomorphism in project-based organizations”	Identifies and classifies the mechanisms responsible for a low variability of management structures and approaches at the project level	Presented at the 4th ScalEM Conference on Industrial Engineering and Management
“The organization design perspective on the project-based organization: A structured review”	Systematically reviews the state-of-the-art of the literature on project-based organizations by applying an organization design perspective	Accepted in the <i>International Journal of Managing Projects in Business</i>
“Towards a design for the project-based organization”	Develops a model for the organization design of the project-based organization by identifying the design dimensions and factors affecting the dimensions in the PBO context	Accepted in the <i>International Journal of Project Management</i>

ROLE OF ONTOLOGIES FOR SMART MANUFACTURING

Negri Elisa – Supervisor: Prof. Sergio Terzi

Smart Manufacturing opens new possibilities to achieve competitiveness in turbulent and highly aggressive markets such as the manufacturing sector, as it is asserted that this new paradigm will bring higher production flexibility, production systems re-configurability and Plug & Produce capabilities, through the technology-enabled self- and context-awareness of the system and automated re-configuration. The shift to Smart Manufacturing is supported by many research and governmental initiatives at country level and consists of the interconnection of smart components into the production system, that are able to generate and exchange big data streams, to adjust the production in an optimal way and to have self-awareness and self-prediction capabilities. Smart Manufacturing systems are based on a set of key technologies, such as the Internet of Things, Service-based architectures and the so-called Cyber-Physical Systems (CPS). CPS are embedded intelligent systems that compose the intelligent production systems in a modular way and are able to bridge between the physical processes and their virtual counterpart. The systemic intelligence of a CPS-based system is provided by the use of semantics through ontologies, which are

used for different purposes: they offer interoperability between different systems by providing a common vocabulary, an effective data integration and sharing and a consistent domain representation necessary for the automated systems to be self-aware. The presented work investigates the role of ontologies within Smart Manufacturing offering a technical advancement that covers gaps found in the literature about industrial engineering ontologies, with an ancillary study on the industry readiness of the companies to the adoption of the semantic smart technologies to frame and guide the technical developments and to understand the industrial relevance of such a research work. The industrial investigation was carried out with interviews to experts from manufacturing companies to find out the industrial perspective on the definition, expected impacts, benefits, risks, barriers and applications of the Smart Manufacturing, complementing them with a view on the currently used technologies and the technological shift to be put in place to achieve Smart Manufacturing systems. Important results have been reached through this analysis that allow an understanding of what companies perceive their AS-IS

situation, TO-BE situation and Transformation phase. This has been structured in frameworks that characterize the perspectives on the Smart Manufacturing (if process- or product-oriented) and of the phases different perspectives must transit in order to reach a full implementation of the Smart Manufacturing. Moreover, a set of considerations showing differences between literature and industry has been elaborated and is worth of further analysis. During the interviews, also a lack of understanding of ontologies potentialities in Smart Manufacturing emerged at industrial level. This inspired an industrially-oriented development of an ontology to demonstrate and validate the role of ontologies for Smart Manufacturing. The ontology development started from an analysis of the manufacturing domain and of the technical and content gaps of existing manufacturing ontologies; subsequently, a framework of ontology requirements from the manufacturing domain was elaborated. The ontology purpose was defined as the semantic knowledge support to the service-based control of the CPS-based production system. In particular, the main advantage of the developed ontology is to provide the CPS coordination and control

with the systemic role of each CPS inside the system, in this way offering a basis for the system self-awareness and the possibility to quickly reconfigure the production system by modifying its semantic representation. The developed ontology is defined in the UML (Unified Modelling Language) and OWL (Ontology Web Language) languages, basing on previous works, on discussions with domain experts and on manufacturing standards. It represents different aspects of the production system: such as the physical aspect (material definition of the system objects), the technological aspect (transformational/functional view of the system, considering the conversion processes and the routing of products), the control aspect (data fields that are necessary for the control activity) and the visualization aspect (supporting the Human-Machine Interaction systems). Testing and validation of the ontology were focussed on industrial applications. The testing was performed by demonstrating that the ontology supported successfully the computation of production KPIs at different detail levels of an existing wood-working line. The validation was conducted by applying the ontology model to a picking system, provided by a

logistic solution provider company, as a support to the control system of the different devices. The validation covered three levels:

- A technical validation demonstrated that the ontology played as a support to the control system, in particular to the Manufacturing Execution System (MES) functions of the system, that supported the awareness of the automated system and that is was flexible to be modified easily by other systems.
- vAn industrial validation covered qualitative and quantitative tests performed at the company premises to understand the benefits perceived by the company and by their end-user as a consequence of the introduction of the ontology into the picking system. The direct benefits were higher flexibility, easier re-configuration, higher modularity that led to reduced software development efforts and time, improved re-usability of software components and improved operations. Other benefits at operational, cost and strategy were identified that will be reached in the future as a consequence of the direct ones.
- An expert validation evaluated the technical development and the application case, by stating that with some attention on

the technical side, the research work was relevant and with high development potential in a wide range of different sectors in a future that is not too far. It also presented a good alignment between the initial purposes and the validated ontology. The developed model is made available openly online through the GITHUB platform, in order to allow it to be modified and adjusted by users who might need it, to be adapted to specific industrial applications and in time. By its nature, if it is meant to be one of the enablers of re-configurability, it must not be rigid itself, but requires a certain degree of flexibility. To sum up, the work demonstrates that the proposed ontological approach supports system flexibility, awareness, modularity, thus leading to shorter commissioning times of new or renewed plants and potential easier re-configurability of the production system. In this way it contributes to the research on the field by showing the role of ontologies for intelligent manufacturing systems with practical examples and offering industrial and technical insights on the Smart Manufacturing paradigm that is key for the future competitiveness of the manufacturing sector.

ASSESSING THE INFLUENCE OF PERSONAL AND ORGANIZATIONAL FACTORS ON SURGEON'S PERFORMANCE: A HUMAN RELIABILITY ANALYSIS (HRA) APPROACH

Onofrio Rossella – Supervisor: Prof. Paolo Trucco

The primary objective of this research project is the identification and assessment of factors that can influence surgeon's performance, and the integration of this knowledge into Human Reliability Analysis - HRA - approaches suitable for healthcare applications. Nowadays the benefits of transferring and applying risk analysis methods, traditionally implemented in high-risk industry, to healthcare services are fully recognized in the patient safety literature. Nevertheless, healthcare organizations are still characterized by a predominant reactive culture in their approach to patient safety. In fact, safety improvements are often made after the analysis of an adverse event or periodical audits and patient records reviews. The evidence that the human errors reduction in healthcare is still an urgent priority is underlined by a recent study (Makary and Daniel, 2016) compiled by the Centers for Disease Control and Prevention (CDC which estimated medical errors as the third biggest cause of death in hospitalizations in the United States. Many scholars, who investigated patient safety issues in healthcare, proposed the application of HRA recognizing the contribution that HRA brought to high-risk industries in terms of human errors reduction and safety improvement. In

particular an important feature of the HRA methodologies, which well fits the need to improve the patient safety in healthcare, regards the HRA anticipatory pattern rather than retrospective one. In detail, estimating the probability of error allows providing ex ante analysis before incidents or adverse events occur and identify appropriate corrective measures that can be implemented before the inadequacies of system can occur. The literature review of HRA applications in healthcare led to the identification of several methodological limitations. In particular, the investigation of influencing factors - IFs - in surgery remains an issue of major concern for scholars. This aspect emphasized the need of a deep adaptation and translation of these techniques, originally designed for the industrial contexts, to the healthcare environment. On the basis of literature gaps and the general state-of-the-art in Human Reliability Analysis in healthcare, especially in surgical context, the specific research objectives set forth in this thesis are: i) designing a taxonomy of IFs for surgery; ii) assessing the perceived influence of the validated IFs on surgeons' performance; iii) testing the proposed taxonomy of IFs and their assessed influence into an HRA application in surgery.

The research methodology is based on multi-phase and mixed method approach which allowed achieving three main results. Firstly, through literature review, field study in robotic surgery, along with focus groups and individual interviews with surgical experts, the ad hoc taxonomy of IFs for surgery has been defined; secondly, the ranking of these IFs, based on their criticality, has been achieved through questionnaire method; and thirdly, the degree of coverage of Error Promoting Conditions -EPCs- (IFs in the specific HRA technique - HEART - chosen for the application) in HRA application in surgery has been investigated through HRA application using the designed taxonomy of IFs. By proposing an ad hoc taxonomy of IFs, the thesis contributes to overcoming a limitation in current literature where the number of HRA studies in healthcare implementing IFs is still scanty; although this is a peculiar component in several HRA techniques and largely adopted in HRA studies in industrial contexts. The thesis fosters the diffusion of HRA applications in healthcare, in particular in surgery, where the diffusion of advanced technological solutions adds further complexity and, consequently, possible new error paths. In terms of managerial implications, it addresses the concerns of

many practitioners (surgeons, risk managers and technology providers) regarding the nature and role of IFs on surgeon's performance. In this direction, possible future applications of the taxonomy are in the areas of training, ergonomic design of medical devices, and surgical safety checklists. This dissertation originates from a research development process that was carried out by the author continuously facing and collaborating with both the healthcare and the scientific communities. The aim was to provide an innovative piece of research that not only proposes an original contribution to scientific knowledge but also provides useful insights to healthcare practitioners for their daily professional activity.

Keywords: Human Reliability Analysis; HRA; Influencing factors; Performance Shaping Factors; Surgery.

ORGANIZING AT THE TOP OF THE HIERARCHY: AN INQUIRY INTO DELEGATION OF DECISIONS

Rovelli Paola – Supervisor: Prof. Cristina Rossi-Lamastra

Over the last 10 years, there has been a resurgence of interest around the study of firms' organizational design. Scholars have devoted a large effort to study Top Management Teams (TMTs). Indeed, TMTs are a fundamental part of firms as they are formed by those managers (including the Chief Executive Officer, CEO) typically involved in deciding the large and strategic issues facing the firm, thus involved in the strategic decision-making. Being responsible of firm's strategy, coordination activities, and allocation of resources, TMT members, and their characteristics, influence strategic and organizational outcomes. However, besides an initial focus on the demographic characteristics of TMT members (e.g., age, nationality, language, education), limited attention has been given to the analysis of TMTs' structure and internal organization (i.e., *TMTs' organizational design*). Therefore, more research is needed to understand what are its antecedents and the implications for firms' performance and strategies. With this thesis, I contribute to this stream of research, trying to fill this gap. One of the reasons behind the limited research on TMTs' organizational design is the availability of useful data. Indeed,

data on TMTs' organizational design are rarely available from secondary sources like commercial databases or balance sheets. Depending on this, before going into the study of the antecedents and the consequences of TMTs' organizational design, I first had to conduct a survey data collection (i.e., the *StiMa project*) to gather data on the organization of TMTs directly from Italian CEOs, then complemented with data from secondary sources (e.g., firms' performance from balance sheets, CEOs' and TMT members' educational background and work experience from their biographies). Therefore, in this thesis I first present the paper zero in which I describe the methodology I adopted to collect data and to check their reliability, and I provide some good practices that can help scholars in collecting data in this realm. Exploiting the unique database I created, I then study organizational design at the top of the firm's hierarchy. For what concern the antecedents of TMTs' organizational design, I specifically focus on the study of delegation or allocation of decision authority (i.e. whether decision authority is centralized or delegated downward the organizational hierarchy), which is one of the most important dimensions of

organizational design. Among the others, delegation helps to make the best use of the knowledge and information distributed within the firm, improves the motivation, creativity, initiative and effort of those employees to whom the decision authority is delegated, and protects the time of senior managers from information overload. As a consequence, delegation ultimately has a positive effect on firm's efficiency and performance. Despite the several contributions that highlighted the positive effects of delegation and, thus, its relevance, the literature still suffers from some limitations. First, it rarely addressed the top of the hierarchy, thus disregarding the delegation of strategic decisions at this level and mainly focusing on the general firm level or plant level of analysis. However, results obtained at these lower levels not necessarily can be generalized at the TMT one. A second important limit of the delegation literature resides in the study of its determinants. Scholars devoted great effort in studying the motivations behind the choice between delegation and centralization, but they rarely considered the role of individual characteristics, which instead may shape organizational design, and thus delegation, ultimately affecting performance.

Therefore, in the first two essays of this research project I study the delegation of strategic decisions at the top of the hierarchy. Specifically, in the first paper I study the allocation of decision authority by the Board of Directors (board) to the CEO and the role of the gender of the latter; in addition, the moderating role of CEO's knowledge is taken into account. Results of the estimations on a sample of decision-level observations demonstrate that the board is less likely to delegate a strategic decision to the CEO when the CEO is a woman due to the gender stereotypes that influence the board's perception of the loss of control and loss of information problems that may arise when dealing with the allocation of decision authority. However, this negative "gender" effect disappears if the female CEO possesses generic managerial knowledge (i.e., she holds an MBA) or substantial decision-specific knowledge (i.e., work experience in the functional area corresponding to the strategic decision taken into account). Once studied allocation of decision authority from the board to the CEO, in the second essay I focus on the choice of the CEO to delegate a strategic decision to the TMT manager who is in charge of the decision domain considered. In this case, I study the role played by the decision-workload of the CEO (i.e., the number of strategic decision s/he is responsible for) and the decision-specific knowledge of both the CEO and the TMT manager. Results prove that the CEO is more likely to delegate a strategic decision

when her/his decision-workload increases, while s/he is less likely when her/his decision-specific knowledge increases. However, the negative effect of CEO's decision-specific knowledge is significant only for low values of decision-workload, while knowledge does not matter when the CEO has too many strategic decisions to deal with. At the same time, TMT manager's decision-specific knowledge matters only when the CEO's decision-workload is very high. Finally, the third essay of the thesis provides a broader view of TMTs' organizational design and moves the attention to the consequences of this organization. In this regard, the variety of studies on this aspect typically considered the different organizational design's elements at the general firm level and separately, without taking into account the complementarities that exist among them. Therefore, in the last essay of the thesis I investigate the configurations arising from these complementarities. In so doing, I consider six main organizational elements of the TMT (i.e., delegation, incentives, coordination, communication, size, and formalization) and I identify three well-characterized clusters, which deploy different configurations of these elements. Basing on their characteristics, I label these configurations as *CEO centric TMT*, *integrated TMT*, and *incentive based TMT*. Then, I study their relation with firm's opportunity exploitation and I find that integrated TMTs and incentive based TMTs perform better in exploiting opportunities in general

and innovation opportunities (i.e., related to changes in processes, products and markets). In addition, integrated TMTs are positively related also to change opportunities (i.e., associated with changes in the organization). To conclude, this research project demonstrates that the allocation of decision authority at the top of the hierarchy is influenced by the characteristics of the individuals involved, as for instance their gender or the knowledge they possess. Moreover, the thesis shows that TMTs may organize accordingly to different configurations of organizational design's elements and that these TMT organizational configurations are associated to different levels of firm's opportunity exploitation. However, this work is not immune to limitations, which open up for further investigations. Particularly, it might be interesting to study the effect of other individual characteristics (e.g., personality traits, physical appearance, common ground shared by individuals) on delegation or how the adoption of TMT organizational configurations depends on the characteristics of the firm.

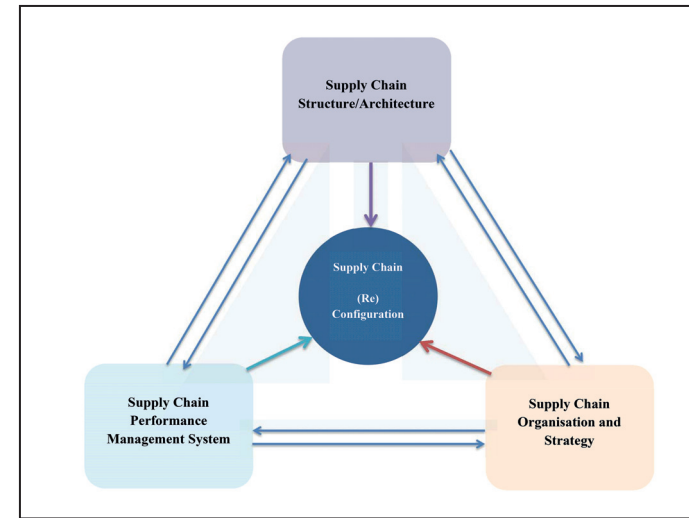
RETHINKING SUPPLY CHAIN CONFIGURATION

Sabri Yasmine – Supervisor: Prof. Guido J.L. Micheli

The central objective of this thesis is to examine the impact of the contextual environment on supply chain configuration settings and decisions. Much has been learnt in prior research into the interplay within the supply chain triad: configuration, contextual environment, and performance. Yet, rapid changes in contextual environments have made the (re) configuration of supply chains a central issue. Research needs to investigate the impact of the contextual environments that are not thoroughly addressed in the literature on supply chain configuration and management. This research builds on the contingency theory concepts, proposing a greater supply chain performance could be attained through achieving a fit between the configuration settings, the internal and external contextual factors, and the strategy. The supply chain configuration is mostly addressed in prior literature in terms of individual functional units. In contrast, the present research investigates supply chain configuration holistically and, to that end, adopts an end-to-end perspective. This entails viewing the supply chain more broadly, as an extended enterprise of networked firms. Central to this proposition, supply chain configuration (and

reconfiguration) is considered to involve three key elements: structural configuration elements, organisation and strategy, and performance management and measurement systems. The thesis comprises a cover essay pinned with a compilation of four studies. Three contextual environments are investigated: process and product innovation practices implementation, corporate organisational structure, and industrial projects. The thesis examines three dimensions: (1) (re) configuring the end-to-end supply chain; (2) the relationship between supply chain configuration and performance; and (3) identifying the organisational antecedents to achieving a supply chain structural and strategic fit. Conclusions are drawn from analysing empirical data on 28 firms located in Italy and Sweden. The data were collected along the supply chain: manufacturer, customer, supplier, and supplier's supplier. The results indicate that although the contextual environment plays a role in shaping the operations and the supply chain strategy, the contextual environment is not reflected in the configuration decision making. It is found that supply chain structures evolve over time, rather than being systematically configured, and that economic performance is

a significant factor in defining certain configuration settings. The analyses suggest that to maximise the tangible added-value of innovation implementation, the supply chain configuration should be close to the structural-strategic fit. The research identifies supply chain collaboration as a key strategy mitigating the shortcomings of misfit. The findings suggest that the highest performers have achieved a cost-service balance with a supply chain configuration characterised by close collaboration, and strong strategic partnerships between the supply chain members. However, since now most supply chains are globally spread, it becomes challenging to foster strategic partnerships as this would affect the configuration's flexibility. Furthermore, the analyses reveal the roles of obscure elements, such as supply chain power structure, institutional pressures, and trust and interpersonal relationships, in determining the configuration settings. The thesis contributes to the supply chain management literature by proposing conceptual frameworks for addressing the supply chain structural and strategic fit (or to reduce the misfit). Moreover, the thesis offers a framework to link the performance management and



1. Rethinking Supply Chain Configuration

measurement system with supply chain strategy. This contribution lays a foundation for a deeper understanding of the various ways to (re)configure the end-to-end supply chain. This research applies contingency theory to a horizontal units context (i.e., supply chain), and investigates the *within* and *between* relationships of supply chain members. The findings suggest an extension of contingency theory, through proposing that organisations should respond to two key attributes of the contextual environment: the magnitude (intensity) and the mix of the contextual factors. Furthermore, the adopted case-

based research strategy helps mitigate the under-application of theory building approaches in contingency studies. In terms of managerial implications, the thesis addresses practitioners concerns regarding the design of an integrated supply chain that delivers differentiated value to the final customer. The syntheses presented here offer supply chain managers a fresh perspective, and a portfolio of possible configuration decision bundles, to draw feasible survival plans for lower performing firms and employing the configuration settings to achieve greater performance. These analyses assist practitioners in assessing

the tangible impact of innovation implementation along the whole supply chain. It should be therefore possible for firms to build capabilities to (re)configure the supply chain, and to survive the competition in the face of a rapidly changing contextual environment.

Keywords: Supply chain configuration, Supply chain fit, Supply chain management, Performance, Contingency theory.

THESIS TITLE: DISENTANGLING THE LABYRINTH OF SUPPLY MANAGEMENT IN MULTINATIONAL CORPORATIONS (MNCS)

Sarker Sudipa – Supervisor: Prof. Paolo Trucco

This research is about the intricacies of supply management in multinational corporations (MNCs). Supply chain research is at least three decades old. Over this period, supply chain researchers have conceptualized the focal firm in the supply chain as a single organization. The present research diverges from this monolithic view of focal firms and contends that large MNCs that apply corporate strategies such as outsourcing and global sourcing, are also structurally complex. This research further argues that the structural complexity of MNCs affects the organization of the purchasing function. One direct implication of this is that, theories and models that have been proposed assuming a single, unified organization as a point of departure do not fit the realities of these large MNCs. This research highlights these misalignments between theory and practice by systematically combining modules of studies. The primary study, an in-depth investigation of a global conglomerate, applied a mixture of case study and collaborative

management research methodologies. The next two studies were guided by case study design and strove to make sense of, validate, and analytically generalize the findings of the first study. The main contribution of this thesis to the field of purchasing and supply management is to demonstrate the effects of the structural complexity (i.e., vertical, horizontal, and spatial complexities) on the organization of the purchasing function. It is argued that academics and practitioners should look beyond the centralized, decentralized, and hybrid structures of the purchasing organization and also take into account the internal structural complexities of MNCs. The four appended papers illustrate how vertical, horizontal, and spatial complexities affect the organization of the purchasing function as well as demonstrate the misalignments between theory and practice. The first paper examines the effects of vertical complexity. It illustrates how the purchasing function is divided into different roles and responsibilities within an MNC.

This division of labor makes the management of supply risk a fragmented, multilevel, and time-dependent activity. This challenges the conventions and norms of risk management theories, models, and standards that assume that risk management in practice is a holistic, integrated, and time-independent activity. Grounded in theories such as bounded rationality and contingency theory, the second paper examines the effects of both vertical and spatial complexity. The paper explains why risk management in practice is silo-based and illustrates how silos are created by the division of labor and contingencies in MNCs. The third paper examines the effects of horizontal complexity. The paper illustrates how an MNC can create purchasing synergy through the development and implementation of a one-size-fits-all supplier segmentation model. The fourth paper extends the understanding of the effects of structural complexity by illustrating how the supply management function is organized in three leading MNCs of the world. It identifies a need to distinguish between the

LOGISTICS OUTSOURCING: EMPIRICAL EVIDENCE TOWARDS VALUE CREATION BY 3PL PROVIDERS

Sassi Chiara – Supervisor: Prof. Sara Perotti

Research Background

This research project is based on the awareness that logistics outsourcing is currently a growing phenomenon and is becoming a strategic lever with a significant impact on shippers' business performance. The annual study conducted by Langley and Capgemini (2015) indicates that the overall market of logistics outsourcing services has increased by 30% since 2010, generating revenue for more than 700 billion US\$. This rise could be explained by several factors, such as international competition and customer demand for delivery timeliness and flexibility, that are progressively pushing companies to consider logistics as a competitive parameter.

In this context, Third Party Logistics (3PL) providers are increasingly becoming an important player of the supply chain and more and more they are called to provide shippers with services that add more value to the shippers' business than shippers would be able to achieve by themselves. This value may involve different perspectives, such as offering the service level agreed with shippers at the minimum cost, meanwhile dealing with the industry complexities efficiently, or developing skills and competences for more value-added activities or

shipper-tailored services.

A deep understanding of such value is a key issue with significant potential to support strategic decision-making, from both 3PL providers and shippers' perspective. Indeed, shippers should be able to evaluate 3PL providers' performance and understand how 3PL providers can achieve such performance. Such evaluation is crucial to choose the logistics partner who best fits the shipper' needs. Similarly, 3PL providers should develop a deep knowledge of the different strategies and their impact in terms of value for shippers, as well as a specific ability to conduct benchmarking analyses investigating the best practices adopted by competitors and the growth directions of the industry. Such insights on different 3PLs value creation mechanisms can support them in improving their services and in a better setting of their offer. Notwithstanding the growing number of scientific contributions in this field, that witnesses the academic interest along with the relevance of the managerial perspective, the topic still needs to be further deepened.

Research Project

According to S-D logic, the value creation in the 3PL industry may be defined as 'the application of 3PL providers' competences for

the benefits of shippers'. Following such logic, the study of the value creation in the 3PL industry should imply three main investigation areas. First the understanding of the shippers' needs perspective. In this direction, the present thesis aims to contribute to the academic literature by first deriving an inclusive taxonomy of logistics outsourcing types (i.e. what kind of relationship shippers sought), as well as a thorough investigation of the whole 3PL buying process, in order to catch its main features. Secondly, it aims to offer an in-depth understanding of how these features change depending on the logistics outsourcing type sought by the shippers.

The second crucial step in the achieving of a deep understanding of the value creation in the 3PL industry is the measurement of the 3PL providers' ability to cope with shippers' needs (i.e. the measurement of the advantages they can offer). In this regard, the present thesis aims to add knowledge to the academic debate by developing a quantitative methodology to assess 3PL providers' performance. The third milestone of the value creation in the 3PL industry consists in the exploration of the strategies and value creation models 3PL providers can pursue to compete on the market, achieve higher and

higher performance and, in the end, accomplish shippers' needs. In this regard, the present thesis aims to enrich and develop logistics and SCM understanding by, first, building a comprehensive framework of the strategies pursuable by 3PL providers, in terms of different resources, knowledge and skills they may develop to answer to shippers' requirements. Second, by deepening different 3PL providers' value creation models.

More in details, this thesis dissertation is composed of a collection of three papers. Given the different nature of the Research Objectives, a methodologically pluralist approach that combined quantitative and qualitative research has been embraced. Methodology adopted for each paper are summarised briefly below.

Title: Types of Logistics Outsourcing and Related Impact on the 3PL Buying Process: Empirical Evidence.

Methodology: After a thorough literature review and a focus group with supply chain managers, a survey of 482 logistics managers was conducted. 107 usable responses were received and a statistical analysis of results was finally performed.

Title: Assessing Efficiency and Innovation in the 3PL Industry: an Empirical Analysis.

Methodology: This paper develops a quantitative analysis of 71 Italian 3PL providers by using Data Envelopment Analysis. Specifically, DEA models allowed the evaluation of the companies' efficiency and innovation. Furthermore, a case study research corroborated the quantitative results by investigating the strategies of best-in-class companies.

Title: Value Creation Models in the 3PL Industry: What 3PL Providers Do to Cope with Shippers' Requirements?

Methodology: First, a systematic combining process has been carried out to understand the main factors and operational strategies enabling value creation by 3PL providers and build a comprehensive framework of 3PL providers' value creation architecture. Second, a qualitative survey involving 44 leading 3PL providers operating in Italy was conducted to understand how 3PL providers can organise themselves to create value to shippers. Semi-structured interviews were chosen as survey method.

Research Implication

The theoretical contribution of this research is three-fold. First, the development of an inclusive taxonomy of different logistics outsourcing models that shippers may adopt in a 3PL relationship, highlighting how key features in the 3PL buying process vary depending on that. Second, the introduction of a methodology to jointly assess 3PL providers' performance based on DEA models. Third, this research develops a comprehensive characterisation of the 3PL providers' value creation architecture and it is a first attempt, even if exploratory in nature, to deepen different 3PL providers' value creation models with the operational strategies to achieve them. From a managerial perspective, this research has significant potential to support strategic decision-making, from both 3PL providers and shippers' perspective. Results help shippers, first, understand the most suitable type of logistics outsourcing relationship to undertake for achieving the desired

competitive advantages. Second, shippers are supported when selecting their 3PL providers as the results can also enhance the understanding of the differences among 3PL providers and the alternative ways through which 3PL providers create value for their logistics processes. Indeed, shippers could better evaluate how 3PL providers may offer value and improve shippers' logistics processes. Moreover, the proposed methodology for the performance assessment, jointly with a thorough awareness on 3PL providers' value creation mechanisms, supports shipper in benchmarking 3PL providers in order to identify the best performers in the market. Such evaluations are crucial to select the logistics partner who best fits the shipper' needs. Similarly, results help 3PL providers in improving their services and in a better setting of their offer, as they contribute to their specific ability to conduct benchmarking analyses, useful to understand their positioning on the market, and to develop a deeper knowledge of the different 3PLs value creation mechanisms to enhance their competitiveness. Indeed, results offer a roadmap for 3PL providers to accomplish different shippers' needs. The proposed value creation models suggest 3PL providers a set of strategies they can pursue to offer different competitive advantages to the market. Moreover, findings supports 3PL providers' decision making process also by discussing the most used strategies in the Italian 3PL industries, as well as the common behavioural patterns that characterises best performers.

SURPLUS FOOD MANAGEMENT: PROCESSES, DRIVERS AND CHALLENGES

Sert Sedef – Supervisors: Prof. Paola Garrone, Prof. Marco Melacini

My research is fundamentally motivated by the paradox of wasted food in the presence of food poverty. I attempt to respond jointly to the food security and resource efficiency challenges, and to strike a balance between social, environmental and economic goals in the food sector, particularly in industrialized countries. A view that hybridizes the circular economy and social innovation paradigms is a side effect of my research, or I dare say another general motivation of the thesis. Therefore, I give special attention to the redistribution option, and attempt to pinpoint how to convert food resources traditionally accepted as food “waste” into food “surplus” that, when managed appropriately, can provide further value. In particular, it can be redistributed for social purposes. To this aim, I study the successful cases of surplus food management with a special emphasis on redistribution for social purposes. My thesis is consisted of 3 parts. The first part *Surplus food management processes, enablers and barriers* investigates operational instruments that can be used to manage surplus food, once it is generated. In this part, I focused on manufacturers and retailers. First of all, I studied how food manufacturers can prevent the

degradation of generated surplus food into waste. Based on an extensive literature review and 4 exploratory case studies, research questions are formulated about available avenues for managing surplus food, and internal drivers that make these avenues viable and efficient. In order to adapt, refine and corroborate the conceptual framework, I conducted 10 descriptive case studies with food manufacturers in Italy. Results from the cross-case analysis highlight the multiplicity of reuse and redistribution options, and their viability over the product shelf life. Moreover, it has been found that a structured surplus food control system and partnerships with food aid organizations are necessary to reduce food waste. Second, I studied a special collaboration between a retailer and non-profit organizations to highlight factors, such as stakeholder engagement and changes in operating processes, which can enable retailers to implement an alternative approach to recovering and redistributing fresh surplus food. The initiative was described by two senior executives using a semi-structured questionnaire. Collected information was triangulated with corporate reports and other publications.

The retailer implemented an expanded supply chain by cooperating with municipalities and food aid organizations. Such a process differed in important ways from the traditional “food bank” model. The latter organizations collected and distributed surplus food to disfavored populations. Finally, I performed a cross-case analysis with 6 retail companies operating in Europe, in Italy, Spain and UK, in order to provide a comprehensive framework of the factors, while also taking contextual differences into account. By interviewing both non-profit organizations and retailers, I identified two main approaches for food surplus redistribution adopted by retailers in collaboration with non-profit organizations. Drawing on circular economy principles and a stakeholder analysis, I discussed the specific characteristics and the implementation of these approaches. The second part *Corporate motives for surplus food donations* takes a different perspective and studies the concepts of corporate philanthropy and corporate giving in manufacturing, retail and food service sectors. In particular, I studied whether an operational efficiency dimension should be included beside strategic and moral motivations of corporate

donations. A multiple exploratory case study methodology has been applied considering a sample of 16 food sector companies operating in Italy. Moreover, three cases have been analysed in depth to highlight the contextual factors that make cost savings possible and donations sizeable and regular. The results show that the willingness of companies to reduce operational costs plays a relevant role in managerial decisions concerning the recovery and donation of unsold products, although to different degrees across the supply chain stages. The third stream *Challenges of surplus food redistribution system* goes beyond the business perspective and studies the debate of food redistribution system, in particular the critiques about food banks. Based on first 16 exploratory interviews performed with the food assistance system stakeholders, and second, 8 open-ended interviews performed with the food bank volunteers and workers, I studied the largest European food bank’s evolution and its current position in the food assistance system. This process has ended up building up a new model of food assistance where the food bank plays a core role and the coordination between food banks, front-line non-profit organizations and social services is crucial for the efficiency of the overall system. Addressing the food insecurity - food waste paradox, my thesis aimed to contribute to practice both for companies and food aid organizations and to political and academic debates that have arisen in the broad domain of

sustainability and are located at the intersection of different disciplines, i.e. operations management, environmental studies, social innovation. From the practical perspective, first of all, presenting the factors to improve surplus food management in companies with a particular focus on redistribution for human consumption will help firms improving the current practices. Second, understanding the position of donors will help non-profit organizations to collaborate more easily with the food donors and to collect a greater amount of food to distribute to the people in need. Finally, policymakers will be able to use this information in order to innovate current policies related to surplus food redistribution to reduce food insecurity in their community. From the academic perspective, this thesis contributes to various streams of literature from sustainable development, waste management to corporate philanthropy and circular economy. First of all, it provides a comparative view across countries using primary data collected from different actors in the surplus food redistribution system. Second, it provides complex and informative picture of surplus food management practices and throughout information on the nexus between the “supply (donors)” and the “demand (receiver)”. Finally, it presents various perspectives and disciplines, as its various chapters show each with an own specific research question and analysis, each with its specific

academic audience. Therefore, it contributes to the identification of new directions of research across different disciplines. Further research is necessary; first of all, to analyze public policies which either obstruct or enable surplus food donations as an option for food business operators would enhance the value of my findings from practical perspective. Second, understanding generalizability of these results in different contexts by enriching the sample analyzed as well as understanding the role of the Stakeholder Theory and Institutional Theory in the decision making and operations management would be useful from the theoretical perspective. In line with these theoretical lenses, it is relevant to characterise the role of the external and internal factors in terms of drivers, enablers and obstacles to the surplus food management process, considering cultural and national differences to integrate the frameworks developed in my research. Finally, it is necessary to identify the potential of industries other than food in terms of recovery and donation of surplus products and resources that otherwise be wasted.

INFORMAL RISK CAPITAL MARKET: BUSINESS ANGELS & CROWDFUNDING FOR THE FINANCING OF START-UPS

Tenca Francesca – Supervisor: Prof. Annalisa Croce

The PhD thesis is a collection of three papers on the dynamics and recent trends in the informal equity capital market, focusing on seed and alternative forms of finance for new entrepreneurial ventures.

The thesis overarching goal is to explore the conditions of access to financial resources for start-ups, investigating the selection process and the underlying investment motivations of Business Angels (BAs) and Crowdfunders (CFs). Both BA and CF financing are promising research streams, where opportunities to enhance current knowledge are numerous. BA research field is still largely underexplored in comparison with institutional financing, while CF, besides a growing literature, is yet a relatively new and under investigated research subject. Each of the papers included in the PhD thesis deals with a particular aspect about the selection strategies of these two types of seed investors, focusing on both rational and emotional motivations for supporting new entrepreneurial ventures. Moreover, the papers make use of a range of investigation methodologies and use original datasets, specifically built for this research. The findings and contributions of the articles are described with deeper detail in

section 5, while here I provide a few highlights.

Paper 1 is an extensive literature review on BAs. It shows that BA research has moved from an early emphasis on the characteristics of BAs and BA market, towards an analysis of the BA investment process. Then, the review puts forward a comprehensive overview of the BAs' investment process along its different phases, highlighting the increasing influence of BA groups and BA networks in the market. These changing dynamics are compelling for entrepreneurs, as they have to deal with more professionalized angel groups and undergo more formal procedures in the evaluation of their business proposals than in the case of investments made by single or small groups of BAs. In addition, I carried out a bibliometric analysis to describe BA research impact, the evolution of the research field, and the level of dispersion of the scientific community. The bibliometric analysis adds an important original contribution to the paper with respect to prior narrative literature reviews on the topic. The results show that studies on BAs' investment process, adopting quantitative methods achieve more successful publications (i.e. they are associated with a higher number

of publications and citations), the scientific community is mostly fragmented and self-referential, but constantly growing over the recent years.

Paper 2 focuses on BAs' groups funding process. For this study, I exploit an original dataset of 1,942 business proposals that sought investment from Italian Angels for Growth, the largest Italian angel group. The dataset includes a finer-grained set of information than similar previous studies on the reasons for rejection of business proposals at the different phases of the investment process, which were coded into five main motivations (i.e. low growth potential, weak entrepreneur/management team, no apparent innovativeness, poor market potential, poor investor-opportunity fit) and on the channels through which the BAs' group came in contact with the venture. Moreover, I enriched such data with venture financial accounting records, retrieved from ORBIS. Using different econometric models, I find that rejection criteria applied by BAs' groups and contact channels change during the subsequent phases of the selection process, providing a better understanding of the factors that influence BAs' decision-making. In particular, business proposals

are rejected more often because of a poor entrepreneurial team and less often for the lack of innovativeness at the screening stage, while poor financial performances are the most common cause of rejection at the due diligence stage. Paper 3 studies CFs' selection process in the reward based CF context, finding that funders attach a certain importance to emotional cues in their decisions to support CF campaigns. In particular, projects that display higher levels of entrepreneurial passion, in terms of higher affective passion and higher preparedness (Cardon et al., 2009), are more likely to reach their funding goal. One strength of the paper is the use of a large and heterogeneous sample of more than 14,600 CF campaigns conducted on Kickstarter, which allowed to validate previous findings in the CF literature. The study makes an original contribution to previous research also for the methodology applied to measure the explanatory

variables (i.e. affective passion and preparedness), computer-based content analysis. This technique that is not very common in management studies in comparison, for instance, with social science ones (see for an exception Loughran and McDonald, 2011; Fanelli and Misangyi, 2006), allows to assess the linguistic content and the semantics contained in each project description (and eventually in the transcripts of the video pitches). It is, therefore, a viable method to assess the role of the entrepreneurial narrative in CFs' decisions at a large scale, a theme that is recently gaining appeal (Mitra and Gilbert, 2014; Tirdatov, 2014). From a theoretical perspective, the papers included in the thesis contribute to different streams of literature: angel financing through the literature review (paper 1), BAs' groups decision-making criteria that unfold in the subsequent stages of the evaluation process (paper 2),

drivers of success in CF campaigns and entrepreneurial passion literature (paper 3). Furthermore, the articles provide several practical implications for entrepreneurs, BAs, CFs and practitioners. Entrepreneurs, through a clearer understanding of the informal investment process can increase their investment readiness and, therefore, their access to capital (paper 1, 2 and 3). Investors have the opportunity to increase the quality and efficiency of their screening processes and expand their access to investment opportunities, getting involved in long-distance investments, through the participation in syndicated investment in angel groups (paper 2) or through CF (paper 3). CF platforms' managers can establish effective mechanisms to overcome the significant level of information asymmetries embedded in the CF model (paper 3) and, therefore, attract both more CFs and entrepreneurs.