

CHALMERS



Entrepreneurial Project Management Developing and Testing the Concept

Master of Science Thesis in the Master's Programme International Project Management

ANDRIUS GEDVILAS

Department of Civil and Environmental Engineering
Division of Construction Management
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden 2012
Master's Thesis 2012:43

MASTER'S THESIS 2012:43

Entrepreneurial Project Management

Developing and Testing the Concept

*Master of Science Thesis in the Master's Programme International Project
Management*

ANDRIUS GEDVILAS

Department of Civil and Environmental Engineering
Division of Construction Management Construction Management
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden 2012

Entrepreneurial Project Management
Developing and testing the concept

*Master of Science Thesis in the Master's Programme International Project
Management*

ANDRIUS GEDVILAS

© ANDRIUS GEDVILAS, 2012

Examensarbete / Institutionen för bygg- och miljöteknik,
Chalmers tekniska högskola 2012:43

Department of Civil and Environmental Engineering
Division of Construction Management
Chalmers University of Technology
SE-412 96 Göteborg
Sweden
Telephone: + 46 (0)31-772 1000

Cover:

A comic strip published by Scott Adams, Inc. Available at: www.dilbert.com

Department of Civil and Environmental Engineering Göteborg, Sweden 2012

Entrepreneurial Project Management
Developing and testing the concept
*Master of Science Thesis in the Master's Programme International Project
Management*

ANDRIUS GEDVILAS
Department of Civil and Environmental Engineering
Division of Construction Management
Chalmers University of Technology

ABSTRACT

In this Master's thesis the knowledge and theory of entrepreneurship is applied to the project management discipline. As a result, a wide range of the entrepreneurship literature is reviewed and the concept of entrepreneurial project management (EPM) is developed. The concept consist of three interrelated parts: (1) the antecedents of EPM, (2) the elements of EPM and (3) the outcomes of EPM. The research part of the dissertation analyses the relation between the antecedents and the elements of EPM. The former is modelled along the four project type dimensions: (1) novelty, (2) technology, (3) pace and (4) complexity of scope. The latter consists of three elements: (1) entrepreneurial project governance, (2) entrepreneurial project management architecture and (3) entrepreneurial project processes and behaviour. It is hypothesized that the proclivity towards EPM is stronger when the novelty, technology and pace is higher and the complexity of scope is lower. The research results revealed that the novelty and pace factors have a small effect on the proclivity towards EPM. It is concluded that technology is potentially the determining factor when embracing EPM. The effects of the complexity factor provided results that were consistently against the hypothesized entrepreneurial direction, which was subsequently reversed. The results of this dissertation research are by no means generalized and apply only to the obtained sample of 83 responses by project managers to the online questionnaire.

KEY WORDS:

Entrepreneurship, Project Management, Entrepreneurial Project Management.

Contents

List of Figures	IX
List of Tables	IX
Abbreviations	XI
Glossary	XI
1 Introduction	13
1.1 Purpose and Research Questions	14
1.2 Rationale of Research	14
1.3 Scope and Limitations	15
1.4 Structure of the Dissertation	15
2 Theory of Entrepreneurship	16
2.1 Entrepreneurship in Economic Theory	17
2.2 Anthropology of Entrepreneurship	19
2.3 Psychology of Entrepreneurship	20
2.4 Entrepreneurship in Organisational Management Theory	20
2.4.1 Entrepreneurial Orientation	21
2.4.2 Entrepreneurial Management	21
2.4.3 Corporate Venturing and Strategic Renewal	23
2.4.4 Corporate Entrepreneurship Strategy	23
2.5 Considering Entrepreneurship in Project Management	25
3 The Concept of Entrepreneurial Project Management	27
3.1 Entrepreneurial Orientation in the EPM Concept	27
3.1.1 Innovativeness in the EPM Concept	27
3.1.2 Autonomy in the EPM Concept	28
3.1.3 Risk-Taking in the EPM Concept	28
3.1.4 Proactiveness in the EPM Concept	29
3.1.5 Aggressiveness in the EPM Concept	30
3.1.6 Entrepreneurial Orientation of the EPM Concept	30
3.2 Entrepreneurial Management in the EPM Concept	30
3.2.1 Strategic Orientation and Commitment to Opportunity	31
3.2.2 Commitment and Control of Resources	32
3.2.3 Management Structure and Reward Philosophy	33
3.2.4 Growth Orientation and Entrepreneurial Culture	34
3.2.5 Entrepreneurial Management in the EPM Concept	34
3.3 Entrepreneurship Strategy in the EPM Concept	34
3.3.1 The Antecedents of EPM: Environmental Conditions	35
3.3.2 The Antecedents of EPM: Entrepreneurial Cognitions	35
3.3.3 The Elements of EPM	36
3.3.4 The Outcomes of EPM	37
3.3.5 Definition of EPM and Concept Scheme	37
4 Project Classification, Entrepreneurship Scale and Research Hypotheses	39
4.1 Overview of Project Classification Frameworks	39
4.2 NTCP: Novelty	40
4.3 NTCP: Technology	41

4.4	NTCP: Complexity of Scope	42
4.5	NTCP: Pace	42
4.6	Project Entrepreneurship Scale	43
5	Research Method	45
5.1	Research Measures	45
5.2	Research Sample	46
5.3	Data Analysis Method	48
5.4	Transformation of Independent Factors	49
6	Research Results	51
6.1	Results for Project Manager's Autonomy	52
6.2	Results for Project Governance	53
6.3	Results for Project Management Structure	54
6.4	Results for Project Resource Orientation	54
6.5	Results for Project Success Measures	54
7	Discussion and Conclusions	56
7.1	Discussing Hypotheses	56
7.1.1	Novelty Effect	56
7.1.2	Technology Effect	56
7.1.3	Pace Effect	57
7.1.4	Complexity Effect	58
7.2	Conclusions and Future Research	59
	References	61
	Appendixes	66
	Appendix I	66
	Appendix II	67
	Appendix III	72

List of Figures

Figure 2.1 The model of corporate entrepreneurship strategy	24
Figure 3.1 The EPM concept development strategy	27
Figure 3.2 The elements of EO in the EPM concept	30
Figure 3.3 The dimensions of EM in the EPM concept	34
Figure 3.4 The concept of entrepreneurial project management (EPM)	38
Figure 4.1 The NTCP model for project classification	40
Figure 4.2 Project entrepreneurship scale (red – most, blue – least entrepreneurial projects).	43

List of Tables

Table 2.1 Disciplines of entrepreneurship research	16
Table 2.2 Categorization of entrepreneurial roles	17
Table 2.3 Conceptualization of entrepreneurial management	22
Table 5.1 Characteristics of research sample	47
Table 5.2 Level reduction of project type dimensions	50
Table 6.1 Summary of significant and potentially significant effects	51
Table 6.2 Main effects of independent factors on project manager's autonomy	53
Table I.1 Comparison of creative-reflective and rational process-driven project management professionals	66
Table III.1 Main effects of independent factors on project governance (I)	72
Table III.2 Main effects of independent factors on project governance (II)	72
Table III.3 Main effects of independent factors on project governance (III)	73
Table III.4 Main effects of independent factors on project governance (IV)	73
Table III.5 Main effects of independent factors on project governance (V)	74
Table III.6 Main effects of independent factors on project management structure	74
Table III.7 Main effects of independent factors on project resource orientation (I)	75
Table III.8 Main effects of independent factors on project resource orientation (II)	75
Table III.9 Main effects of independent factors on project resource orientation (III)	76
Table III.10 Main effects of independent factors on project success measures (I)	76
Table III.11 Main effects of independent factors on project success measures (II)	77
Table III.12 Main effects of independent factors on project success measures (III)	77
Table III.13 Main effects of independent factors on project success measures (IV)	78

Abbreviations

EPM	Entrepreneurial Project Management
EM	Entrepreneurial Management
EO	Entrepreneurial Orientation
CES	Corporate Entrepreneurship Strategy

Glossary

R Squared	Denotes the fraction of variance explained by the model
F	The ratio of variances in two independent samples
p	Measures the significance of the difference between two independent samples
η^2	Denotes the fraction of variance explained by the independent factor in the model (read: partly eta squared)

1 Introduction

The concept of entrepreneurial management emerged back in 1970s when bureaucratic, command and control based organisations were no longer capable to satisfy the growing ambitions of the new and well-educated workforce seeking for challenge and self-actualization (Kanter, 1986). In addition, Kanter (1986) attributes this organizational revolution to the growing competition and accelerated pace of innovation and change in the business environment that required creativity and flexibility, characteristics that most of the bureaucratic organisations lack so much. Project and team-based organisation was at the forefront of entrepreneurial workplace and was becoming a norm, providing significantly increased responsibilities, authority and discretion to the workforce that was previously bounded by the neatly knit bureaucratic traps (Kanter, 1986). With a growing interest in organising work around projects, international institutions emerged that captured, standardized and spread project management knowledge, best practices and tools to organisations attempting to secure growing capital expenditure on these temporal endeavours. This growing body of knowledge has yet again created bureaucratic type procedures of corporate control over contemporary way of organising work around projects and those engaged in project work (Hodgson, 2002, 2004). What once gave a leap away from bureaucratic towards entrepreneurial organisation has come around as a tool for rebureaucratization of modern institution, arguably, impeding creativity and innovation. Over 70% of project managers are burdened by the bureaucracy of project management processes (Crawford et al., 2005; in Geraldi, 2009), which makes them the ‘*trustees*’ of paper and form in a bureaucracy, in contrast to being ‘*promoters*’ of creativity and innovation in an entrepreneurial organisation (Stevenson, 1999).

It is now a common practice to start a research paper in business and organisational management by referring to the ever increasing pace of change and turbulence of an external environment, and as a consequence, growing unpredictability and uncertainty, and the need to strike a balance between contradicting characteristics of flexibility and efficiency, creativity and control. The ‘new competitive landscape’ created by the incredible technological achievements in the late twentieth century has made entrepreneurial mindset a must-have characteristic for all managers in order to sustain innovation and dynamic capabilities of an organisation (Bettis and Hitt, 1995; Teece, 2007). Project management has established its presence as a tool for carrying out organisational strategies and in many cases became the framework for operationalizing core activities of a company, arguably, making it the process that either impedes or facilitates dynamic capabilities. It is in the interest of this thesis paper to define the concept of entrepreneurial project management that facilitates the dynamic capabilities of an innovative and entrepreneurial organisation.

1.1 Purpose and Research Questions

The purpose of this Master's thesis is to develop the concept of entrepreneurial project management, henceforth EPM, and to research to what extent this concept applies to various project types. To achieve this purpose the theory of entrepreneurship is reviewed and aspects applicable for examining project management discipline are identified. The following questions are raised to illustrate the goals of this research:

How can entrepreneurial project management be defined and conceptualized?

What type of projects exhibit the most entrepreneurial management of projects as it is defined and conceptualized in this thesis?

In addition to the research questions, several hypotheses are raised in Chapter 4 regarding the level of EPM expected to be observed along various project type dimensions.

1.2 Rationale of Research

The rationale of this research is twofold. First of all, as outlined in the introduction, the surprising environment of today's business necessitates the possession of dynamic capabilities. As project management has become the core process in many organisations and with the possibility to define this process with a step-by-step bureaucratic precession, it is threatening to impede innovation process of an organisation and further development of project management discipline itself. The words of the world renowned scholar and researcher in corporate strategy and innovation, David J. Teece, clearly illustrate this point:

The existence of layer upon layer of standard procedures, established capabilities, complementary assets, and/or administrative routines can exacerbate decision-making biases against innovation (Teece, 2007, p. 1327).

Opposite to the bureaucratic, control and efficiency seeking organisation is the organic organisation capable of creativity and innovation (Aiken and Hage, 1971). In today's environment both of these contradicting characteristics, innovation and efficiency, are highly desirable, which entrepreneurial management and organisation addresses (Brown and Eisenhardt, 1998; Eisenhardt et al., 2000; Ireland et al. 2009). Thus, it is a very interesting and valuable perspective for defining and examining entrepreneurial capabilities of project management that are focused on fostering innovation while at the same time seeking efficiency in execution. In addition, to the current author's knowledge, the perspective of entrepreneurship has not been used directly to research project management.

Another rationale for this research addresses the needs of well-educated and creative project managers, who are seeking for challenging projects with significant discretion for action and decision making. The outlined typology of project management entrepreneurship can guide project managers in making the right decisions for choosing a career path, either focusing on an administrative project organisation for

efficiency and control or being a creative decision maker and promoter of innovation in an entrepreneurial company or, ultimately, being able to balance the two extremes.

1.3 Scope and Limitations

The scope of this Master thesis includes a review of entrepreneurship theory in various disciplines, applying this knowledge to develop the EPM concept and to partly test how it applies to the obtained research sample. The concept is tested by analysing interactions between project's environmental conditions (see Chapter 4) and the elements of the EPM concept (see Chapter 3). The analysis of other interactions in the EPM concept is outside the scope of this research. In addition, the outcomes of the concept are not analyzed and it is not the intention of this dissertation to analyse if entrepreneurial approach to managing projects is actually superior compared to other approaches. Also, the development and administration of a survey questionnaire is a major part of the scope and a source of many limitations (see Chapter 5).

1.4 Structure of the Dissertation

Dissertation is structured as follows: Chapter 2 contains a review of the entrepreneurship literature; in Chapter 3 the obtained knowledge is utilized to develop the concept of EPM; in Chapter 4 a framework to define the environmental project conditions is selected and adopted to the EPM concept by raising hypothesis; Chapter 5 discusses the research method and its limitations; the research results are presented in Chapter 6; finally, the thesis results are discussed and conclusions are made in Chapter 7.

2 Theory of Entrepreneurship

Entrepreneurship is a scientific phenomenon of interest to a variety of research fields. With its origins found in the economic literature in the early eighteenth century (Hebert and Link, 1989), it later gained attention by scholars in anthropology (e.g., Stewart, 1991), psychology (e.g., Gartner, 1989), strategic (e.g., Ireland, Covin and Kuratko, 2009) and organisational management (e.g., Stevenson and Jarillo, 1990). Long history of research in entrepreneurship has provided a number of paradigms to explain the existence of entrepreneurial activity, thus complicating the common understanding of this phenomenon, since no generally acclaimed definition of entrepreneurship has been reached (Ahmad and Saymour, 2008). However, there are two prevailing definitions of entrepreneur and, as a result, of entrepreneurship used in research and recognized well by general society. Baumol (1993, p. 198) presents these definitions of an entrepreneur as someone “who creates and then, perhaps, organizes and operates a new business firm” and “as the innovator – as the one who transforms inventions and ideas into economically viable entities, whether or not, in the course of doing so they create or operate a firm”. The definition that is of interest to the current research is rather that of an innovating entrepreneur and less so of an enterprising. The general questions of interest and contributions of various disciplines in researching entrepreneurship are presented in Table 2.1.

Table 2.1 Disciplines of entrepreneurship research (Stevenson and Jarillo, 1990)

Line of inquiry	Causes	Behaviour	Effects
Main question	Why	How	What
Basic discipline	Psychology, anthropology	Management, strategy	Economics
Contributions	Importance of individual; environmental variables are relevant	Entrepreneurship is a feasible and necessary concept for large mature corporations; entrepreneurship management principles	Entrepreneurship is the function by which growth is achieved; distinction between entrepreneur and manager

This section reviews the contributions of various scientific fields to the knowledge of entrepreneurship. The economic theory of entrepreneurship is reviewed from the perspective of the most prominent authors. The main contributions and findings of entrepreneurship research in anthropology and psychology fields are presented briefly to expand the understanding of main attributes of entrepreneurial behaviour specific for this research. Strategic and organisational management concepts surrounding entrepreneurship are presented in general from organizational perspective and in later chapter is elaborated to fully construct the theoretical background of this

research. Lastly, after a review of entrepreneurship theory, a short philosophical consideration of the research approach is made.

2.1 Entrepreneurship in Economic Theory

Aiming to conceptualize the common definition of entrepreneurship, Hebert and Link (1989) review the most influential writers in the economic theory of entrepreneurship: Richard Cantillon (c. 1680-1734), Joseph A. Schumpeter (c. 1883-1950), Theodor W. Shultz (c. 1902-1998) and Israel M. Kirzner (c. 1930). The authors also take a greater view on entrepreneurship and emphasize the prevailing heroic image of an entrepreneur, who is a major source of innovation and economic growth in the capitalist economy. In addition, they present various definitions and roles of an entrepreneur that exist in economic literature by categorizing them into static and dynamic (Table 2.2). In the authors' view, static entrepreneurship theories are inadequate and only represent "repetitions of past procedures and techniques already learned and implemented" (p. 41). Thus, a manager performing his day-to-day duties or following business-as-usual routines cannot be considered to be an entrepreneur.

Table 2.2 Categorization of entrepreneurial roles

Static	Dynamic
Supplier of financial capital	Person who takes risk in the context of uncertainty
Manager or superintendent	Innovator
Owner of a firm	Decision maker
Employer of factors of production	Industrial leader
	Organiser and coordinator of economic resources
	Contractor
	Arbitrageur
	Allocator of resources among alternative uses

Richard Cantillon, the French economist, is generally accredited to be the first to coin the term entrepreneurship that initiated academic research in this field (Ahmad and Saymour, 2008). Around the 1730s he described three actors in then emerging market economy: (1) a financially independent landowner, (2) an entrepreneur, as central actor in the economy, who takes risk to make uncertain amount of future profit and (3) a labourer who avoids risk by receiving stable income for his/her work (Hebert and Link, 1989). The three main variables of entrepreneurship as a function can be identified from the description above: it is *risk*, *uncertainty* and *profit*. These variables are visible in the most of theoretical discussions about entrepreneurship in economic context. In addition, as Hebert and Link (1989) put it, Cantillon identified market supply-demand disequilibrium as a driving force for entrepreneurship to exist. On the downturn, Cantillon saw entrepreneur as a sole actor in economy dealing with uncertainty and thus limits applicability of this theoretical concept, since nowadays uncertainty is omnipresent and faced by many actors in economy (Hebert and Link, 1989).

One of the most influential writers on entrepreneurship in economic theory is Joseph A. Schumpeter. First and foremost, he saw entrepreneur as a creative innovator who disturbs the static and routine “economical status qua” or what he called “the circular flow of economic life” (Hebert and Link, 1989, p. 43). As Hebert and Link (1989, p. 45) describe it, to Schumpeter economic equilibrium is a “point of departure” for economic development made possible by entrepreneur “carrying out new combinations of production”. In other words, entrepreneur in Schumpeter’s taxonomy is a creator of change or disequilibrium and not a result of it. The function of an entrepreneur in this context is “to overcome these difficulties [uncertainties] incident to change of practice” (Schumpeter, 1928; in Hebert and Link, 1989, p. 44). The success of it depends in part from entrepreneur’s creative use of new knowledge and new information that creates opportunities for change (Teece, 2007). The creative component of an entrepreneurship was later criticized as insufficient alone to enable entrepreneur to conduct the change successfully and additional components, e.g., *cooperation* by Hirschman (1958; in Hebert and Link, 1989), were proposed as complementary perspectives. Cooperation stands for entrepreneur’s ability to come to an agreement with all interested parties in delivering the change (Hebert and Link, 1989).

Nobel Prize Laureate in Economic Sciences Theodor W. Schultz (c. 1902-1998) conceptualized entrepreneurship upon the theory of human capital and saw entrepreneur as an individual who gains rewards working towards restoring economic equilibrium, whether it is a relocation of services by labourers or relocation of resources (e.g. time) by students or housewives (Hebert and Link, 1989). In Schultz’s words, entrepreneurship is “the ability to deal with disequilibria” (Hebert and Link, 1989, p. 45) where “regaining equilibrium takes time, and how people proceed over time depends on their efficiency in responding to any given disequilibrium and on the costs and returns of the sequence of adjustments available to them” (Schultz, 1975; in Foss and Klein, 2012, p. 36). In his taxonomy virtually everyone can be an entrepreneur if he/she adjusts to changes for personal gain in all sorts of disequilibrium conditions. Schultz saw entrepreneurial “ability to deal with disequilibria” as a scarce resource which follows supply and demand functions given this ability provides a useful service to create “identifiable marginal product” for a “differential return” (Hebert and Link, 1989, p. 45). Lastly, Schultz had an interesting position regarding risk, where it is not an idiosyncratic attribute of his entrepreneur, since he argues that there are people who assume risk but are not entrepreneurs (Hebert and Link, 1989). In contrast, uncertainty-based definitions of entrepreneurship cannot diminish the importance of risk (Hebert and Link, 1989).

The latest theory of entrepreneurship has been promoted by Israel Kirzner, where the fundamental nature of his entrepreneur is “alertness to profit opportunities” (Hebert and Link, 1989, p. 46). In contrast to Schumpeter’s entrepreneur as an autonomous imaginative creator of disequilibrium, Kirzner’s (2009, p. 148) entrepreneur depends on “ability to notice, earlier than others, the changes that have already occurred, rendering existing relationships inconsistent with the conditions for equilibrium”. Therefore, skills

to explore and exploit opportunities by which economic markets move towards equilibrium are essential to Kirzner's entrepreneur. The theory is built on three fundamental premises: (1) "vision of the market as an entrepreneurial process", (2) "marketplace engenders a learning process" and (3) belief that "entrepreneurial activities are creative acts of discovery" (Hebert and Link, 1989, p. 46). The example Kirzner uses to explain this is that of an arbitrageur, who learns past temporal or spatial demand errors in markets and thus is able to purchase goods cheap and sell at high prices (Hebert and Link, 1989). Critics attacked this "single-period-market" view as it was downplaying the importance of uncertainty, without which one can not explain entrepreneurial losses (Hebert and Link, 1989, p. 47). To embrace uncertainty as central to the role of entrepreneurial activity Kirzner discusses multiperiod decisions where "entrepreneurial alertness must include the entrepreneur's perception of the way in which creative and imaginative action may vitally shape the kind of transaction that will be entered into in the future market periods" (Kirzner, 1985; in Hebert and Link, 1989, p. 47).

Herbert and Link (1989) concluded the article by consolidating historical aspects of entrepreneurship that include "risk, uncertainty, innovation, perception, and change" into a single definition of the entrepreneur as an individual who "specializes in taking responsibility for and making judgemental decisions that affect the location, form, and the use of goods, resources, or institutions" (Herbert and Link, 1989, p. 47). They explicitly contend that entrepreneur is an individual (as opposed to teams, organisations, etc.) who makes counter-intuitive decisions because of different possession of information or insight of events or opportunities at hand. In their view, everyone can be an entrepreneur if his/her judgement is outside the norms and has courage to follow it and assume responsibility regardless of the results achieved.

2.2 Anthropology of Entrepreneurship

An extensive overview of entrepreneurship in anthropological research is presented by Stewart (1991). At the origins of this perspective in the mid-twentieth century anthropologists embraced entrepreneurship as a possible way to explain processes of social and cultural change and economic development. In anthropology entrepreneurship is seen as a multidimensional social and cultural process that is not connected to an individual or a role directly, but is rather an aspect of a role or function focused towards actions and activities for exploitation of opportunities for expansion and/or profit.

Entrepreneurship in anthropology is studied from several different perspectives. First of all, anthropologists show the importance of knowledge and skill accumulation in attaining high levels of entrepreneurship. Secondly, anthropologists study the crucial role of informal methods, such as "personal networks" and "imitative entrepreneurship", in acquiring resources (skills, labour, etc.) necessary for conducting entrepreneurial activities. Thirdly, anthropologists coined the term "opportunity structure" to explain the extent of entrepreneurial activity and its outcomes. Simply put,

the more there are opportunities and participants capable to act upon these opportunities in the economic system, the higher the degree of entrepreneurial activity and its outcomes. In addition, terms related to opportunity structure and of interest to anthropologists are “access to entrepreneurial activity” (i.e., by ethnic groups) and “spatial clustering” of entrepreneurship (i.e., Silicon Valley) (Stewart, 1991).

2.3 Psychology of Entrepreneurship

Psychologists attempt to understand what distinguishes entrepreneurs from non-entrepreneurs, where entrepreneurs are creators of new business ventures (Baron, 1998). There are basically two different psychological aspects that researchers study to differentiate entrepreneurs: (1) personality traits and characteristics (e.g., Gartner, 1989) and (2) human cognition (e.g., Baron, 1998). The research approach for studying both aspects is similar: compare entrepreneurs and non-entrepreneurs (e.g., managers) and identify distinguishing factors.

Malach-Pines et al. (2002) compare entrepreneurs and managers against 14 different traits and characteristics. He finds that there is no significant difference between the two in their commitment, involvement, energy, self-confidence, need for control and love of management. What distinguishes entrepreneurs from managers in this study is that entrepreneurs have significantly stronger love for challenge, are greater risk takers, like to initiate things, prefer to be independent, are more realistic, creative, optimistic and greater dreamers. Critics of this approach argue that there are people who possess similar traits and characteristics to those of entrepreneur's, but never become ones, propose to study differences in human cognition to distinguish entrepreneurs (Baron, 1998).

In one of the cognitive approach studies, Palich and Bagby (1995) find that risk propensity of entrepreneurs and non-entrepreneurs is similar, but when presented with identical business scenarios entrepreneurs perceive situations as having more opportunities and strengths, significantly opposite to non-entrepreneurs who see more threats and weaknesses. In another article by Kahneman and Lovallo (1994; in Baron, 1998), it is argued that some managers and entrepreneurs in particular tend to undertake risky ventures because they do not accept or recognise risk as a result of decisions and forecasts being made in isolation from relevant past experiences, with a blinding focus on prosperous future only, what often leads to serious problems or the dark side of entrepreneurship. Whether or not entrepreneurs are different from ordinary people remains a great debate among researchers. Thus, the attention of scholars shift to exploring conditions for stimulating entrepreneurship by observing how and under what conditions entrepreneurial behaviour appears.

2.4 Entrepreneurship in Organisational Management Theory

Entrepreneurship in organisational management theory is consolidated under the umbrella term of *corporate entrepreneurship* (or *intrapreneurship*), where most of the research can be categorized into four areas: *entrepreneurial orientation* (e.g. Miller,

1983), *entrepreneurial management* (e.g. Stevenson and Jarillo, 1990), *corporate venturing* (e.g. Guth and Ginsberg, 1990) and *corporate entrepreneurship strategy* (e.g. Ireland, Covin and Kuratko, 2009). As a result, there is a lack of universally accepted definition and confusion prevails as in the general theory of entrepreneurship (Sharma and Chrisman, 1999). In the following sections these areas are briefly introduced.

2.4.1 Entrepreneurial Orientation

Studies of entrepreneurial orientation (EO) measure the firm's entrepreneurial posture on five dimensions. The initial three included in the study by Miller (1983) are (1) *risk-taking*, (2) *innovativeness* and (3) *proactiveness* towards competition. Later, this conceptualization was expanded by adding (4) *aggressiveness* towards competition and (5) *autonomy* of workforce (Lumpkin and Dess, 1996).

Miller (1983) argued that truly entrepreneurial organisation will have a high score when measuring its propensity to take risk, be innovative and proactive. He argued that “[w]ith the growth and complexification of organizations, there is continually a need for organizational renewal, innovation, constructive risk-taking, and the conceptualization and pursuit of new opportunities” (p. 770). *Risk-taking* and *innovativeness* are probably the two dimensions most associated with entrepreneurship (see Section 2.1). *Proactiveness* dimension comes into play as an important aspect, since Miller (1983, p. 771) argues that “entrepreneurial firm [...] is *first* to come up with “proactive” innovations, beating competitors to the punch”, whereas nonentrepreneurial firm is a passive follower of a competitor that is leading the way.

Lumpkin and Dess (1996) argued that Miller's (1983, p. 771) description of proactiveness as “beating competitors to the punch” actually captures a very important entrepreneurial posture of competitive *aggressiveness* that is needed to fight the competition. They also proposed *autonomy* of action as an important measure, since they argue, revisiting Kanter (1983), that “[l]ayers of bureaucracy and organizational tradition rarely contribute to new-entry activities in existing firms” (p. 140), reinforcing Teece's (2007) position presented in Section 1.2. In contrast, “individuals who are disengaged from organisational constraints” make entrepreneurship thrive in organisational environment (Lumpkin and Dess, 1996). Unfortunately, this position of autonomy in EO was not truly accepted until its importance has been reinforced recently (Lumpkin et al., 2009). As these studies measure the extent of organizational entrepreneurship, entrepreneurial management scholars are focused on institutionalizing processes that enable organisations to behave in an entrepreneurial manner.

2.4.2 Entrepreneurial Management

Stevenson and Jarillo (1990) were the first to conceptualize entrepreneurial management. They defined entrepreneurship as an approach to management and behaviour whereby “individuals – either on their own or inside organizations – pursue opportunities without regard to the resources they currently control” (p. 23) and made several propositions that constitute entrepreneurial management. They argued that pursuit of opportunities depends on attitude and empowerment of individuals below the

top management and that traditional control and command management is incompatible with entrepreneurial management. In a nutshell, they proposed roles to be created specifically for exploiting opportunities by individuals who are specially trained for this purpose and motivated by rewards regardless of the results. Also, organisations are encouraged to facilitate networking and resource sharing to attain higher levels of entrepreneurial behaviour which may result in new technological or managerial innovations. These propositions imply a fundamental change of organisational culture and shift of authority towards lower level management. In the subsequent articles, Stevenson improved and expanded the concept of entrepreneurial management by describing how six dimensions of business practice should be managed in order to contribute to corporate entrepreneurship.

Stevenson (1999) uses two behavioural extremes to illustrate two distinct domains of business conduct. At one extreme is the entrepreneurial behaviour presented by the “promoter”. He/she is a confident pursuer of opportunity regardless of the resources under possession. At the other extreme is the administrative behaviour presented by the “trustee”, who is primarily concerned with the efficient use of resources under control. The six business dimensions that are confronted by the different management approach are (1) strategic orientation, (2) commitment to opportunity, (3) commitment of resources, (4) control of resources, (5) management structure and (6) reward policy. Later, when developing a measurement tool for analysing entrepreneurial management of a firm, Brown Davidsson and Wiklund (2001) added two more business practice dimension to compare at the extremes: (7) growth orientation and (8) entrepreneurial culture. These dimensions and main characteristics of distinct management approaches are presented in Table 2.3.

Table 2.3 Conceptualization of entrepreneurial management (Brown et al., 2001)

Entrepreneurial focus (promoter)	Conceptual dimension	Administrative focus (trustee)
Driven by perception of opportunity	Strategic orientation	Driven by controlled resources
Revolutionary with short duration	Commitment to opportunity	Evolutionary with long duration
Many stages with minimal exposure at each stage	Commitment of resources	A single stage with complete commitment out of decision
Episodic use or rent of required resources	Control of resources	Ownership or employment of required resources
Flat, with multiple informal networks	Management structure	Hierarchy
Based on value creation	Reward policy	Based on responsibility and seniority
Rapid growth is top priority; risk accepted to achieve growth	Growth orientation	Safe, slow, steady
Promoting broad search for opportunities	Entrepreneurial culture	Opportunity search restricted by resources controlled; failure punished

It is important to clarify what Stevenson (1999) actually understands as being entrepreneurial management. Since promoter and trustee represent the extreme points of the scale, he defines overlapping portions of the scale as entrepreneurial and administrative behaviour, where “entrepreneurial management is not an extreme case, but rather a range of behaviour that consistently falls at the end of the spectrum” (p. 10). It is to imply that certain administrative behaviour is necessary for entrepreneurial management to be effective as opposed to completely extreme case management only. An interesting illustration of this aspect in high-tech product development can be found in the book by Brown and Eisenhardt (1998).

2.4.3 Corporate Venturing and Strategic Renewal

Guth and Ginsberg (1990) proposed a new perspective on corporate entrepreneurship, whereby suggesting that the true indicator of entrepreneurship within established businesses is the development of new ventures and “renewal of key ideas on which organisations are built” (p. 5). According to them, corporate venturing reflects the true colours of entrepreneurship as presented by Kirzner and Schumpeter (see Section 2.1), where it involves the exploration and identification of market opportunities and the creation of new resource combinations in order to exploit these opportunities and enhance firm’s performance. To indicate the importance of continuous strategic renewal they quote Stevenson and Jarillo’s (1986) argument that “if a company wishes to continue to be entrepreneurial, it must convince everyone that change is the company’s overriding goal” (in Guth and Ginsberg, 1990, p. 5).

2.4.4 Corporate Entrepreneurship Strategy

Ireland, Covin and Kuratko (2009) conceptualize major knowledge in corporate entrepreneurship under corporate entrepreneurship strategy (CES) model that includes (1) the antecedents, (2) the elements and (3) the outcomes of CES. After reviewing the existing and somewhat conflicting concepts of CES, the authors redefine it as “a vision-directed, organization-wide reliance on entrepreneurial behavior that purposefully and continuously rejuvenates the organization and shapes the scope of its operations through the recognition and exploitation of entrepreneurial opportunity” (p. 21). The model of CES is depicted in Figure 2.1.

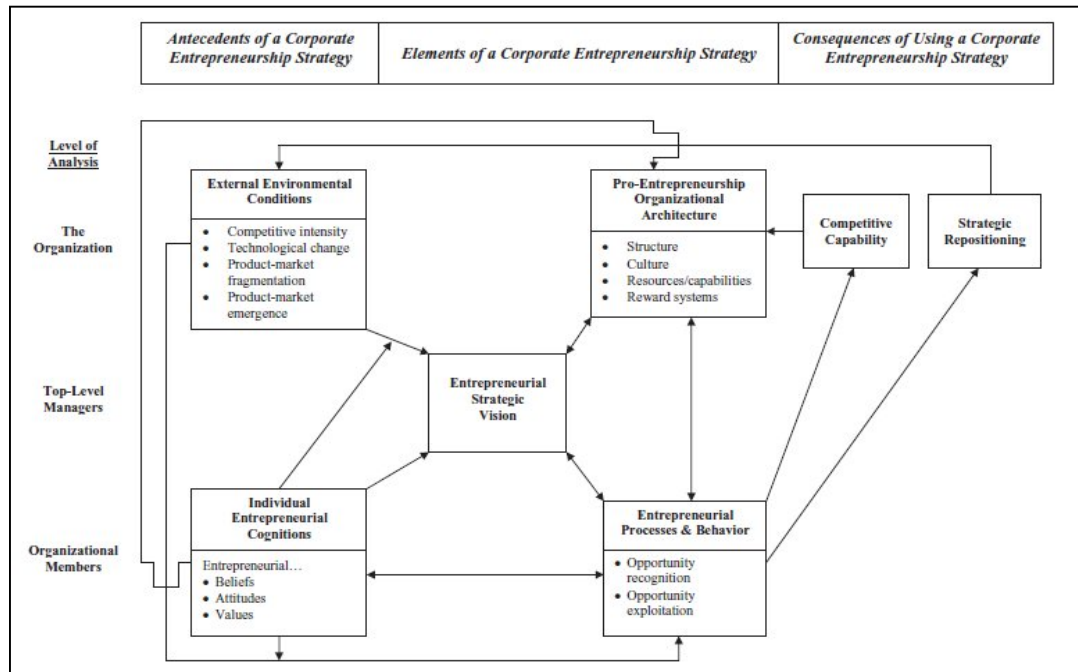


Figure 2.1 The model of corporate entrepreneurship strategy (Ireland, Covin and Kuratko, 2009)

One of the main reasons for firm's to engage in CES is the condition of an external environment. Researching various types of organisations Miller (1983) finds that the more dynamic and hostile the environment, the more firms are entrepreneurial. The second factor why some organisations appear to pursue CES, regardless if it is intentional or not, is because of the people it employs. Ireland, Covin and Kuratko (2009) include individuals' beliefs, attitudes and values regarding entrepreneurship as the second antecedent for CES. Probably the best known example of an individual determination to pursue opportunity, regardless of resources under control and without CES in place, is that of the Post-it note story in 3M Company (Pinchot, 1985). Fortunately, there are means to support such entrepreneurial behavior.

First and foremost, CES is reinforced by the vision of corporate leadership. Once in place it must be well communicated and appropriate organisational architecture must be put in place for entrepreneurial behaviour to take place flawlessly and independently, a task which is the most difficult (Ireland, Covin and Kuratko, 2009). The quality of structural organicity (proclivity towards decentralized decision making, low formality, wide spans of control, etc.), entrepreneurial culture (management support, work autonomy, etc.), organisational resources, capabilities and reward systems very much impact the successful execution of CES. These aspects contribute strongly to the main entrepreneurial process of opportunity recognition and exploitation. As seen in Figure 2.1 the main components are highly interrelated which makes this strategy very difficult, but on the other hand, very rewarding if it is executed properly. In a nutshell, CES is associated with increased firm's performance because of improved competitive capabilities through capability development that occurs when organization and individuals engage in entrepreneurial activities; and continuous strategic repositioning

or adaptation, since opportunities are constantly explored. These outcomes are of the most importance to organisations working in today's turbulent business environments (Ireland, Covin and Kuratko, 2009).

This concludes the overview of entrepreneurship theory. In the next section an appropriate approach to research entrepreneurship in project management is considered.

2.5 Considering Entrepreneurship in Project Management

There are many possible perspectives to put project management and especially the project manager into the shoes of entrepreneurship. For example, consider highly hypothetically, as if project management discipline would be a market and project manager an actor in this market. Then, we could consider at least two options for a project manager to behave in an entrepreneurial fashion. Firstly, the Schumpeterian perspective of project management entrepreneurship (or an act of it) could be described if a project manager develops new project management processes, tools, ways of working, etc., thus being a creative innovator who assumes the uncertainty of introducing change, hopefully for the profit in terms of improved project delivery performance. The second perspective could be that of Kirzner's entrepreneur, who is alert to market opportunities. If a project manager is alert to our hypothetical external project management market and recognises opportunities to improve the existing organizational practices, tools, processes, etc., he/she is an entrepreneur in Kirzner's fashion. In addition, as presented in Chapter 2.1, everyone can be considered an entrepreneur whose judgement is outside the norms, who has guts to pursue it and assume the consequences regardless of the results. But the aim of this research is not to discover if project managers act like entrepreneurs. Nor it is to discover if project managers are entrepreneurs in their traits and characteristics. It is rather to discover if they have freedom to act like entrepreneurs that is of interest to this research. Actually, it is very important to distinguish entrepreneurial management from entrepreneur, because the management style of an actual entrepreneur can be significantly different from the concepts of entrepreneurial management.

It could be argued that the project manager's work itself resembles entrepreneurial process: examining feasibility, planning, obtaining resources and executing the plan are often parts of the process when creating new business ventures. If it would also include the recognition of the opportunity for the project, the decision to execute it and persuade others to follow and not just plain delivery that project managers are usually responsible for, it could then be an example of an intrapreneurship. But yet again, the purpose of this research is not to discover if project managers engage in intrapreneurship, but rather to measure how entrepreneurial their project management approach is. Thus, this implies to measure the factors of entrepreneurial orientation, entrepreneurial management and entrepreneurial strategy concepts, which are considered carefully in Chapter 3 for conceptualizing EPM. These concepts apply at organisational level. Can they be applied at project level? If projects are seen as temporary organisations, an approach for project management research

proposed by Packendorff (1995), the same logic, in theory, should hold. In the next chapter, the most prominent theories of organizational entrepreneurship are used to develop the concept of EPM.

3 The Concept of Entrepreneurial Project Management

In this chapter the concept of entrepreneurial project management (EPM) is developed by considering applicability of the concept elements of entrepreneurial orientation (EO), entrepreneurial management (EM) and corporate entrepreneurship strategy (CES) to the discipline of project management. Figure 3.1 illustrates the concept development strategy and elements under discussion in this chapter with respective section number in brackets. The chapter is concluded by presenting the complete concept and definition of EPM.

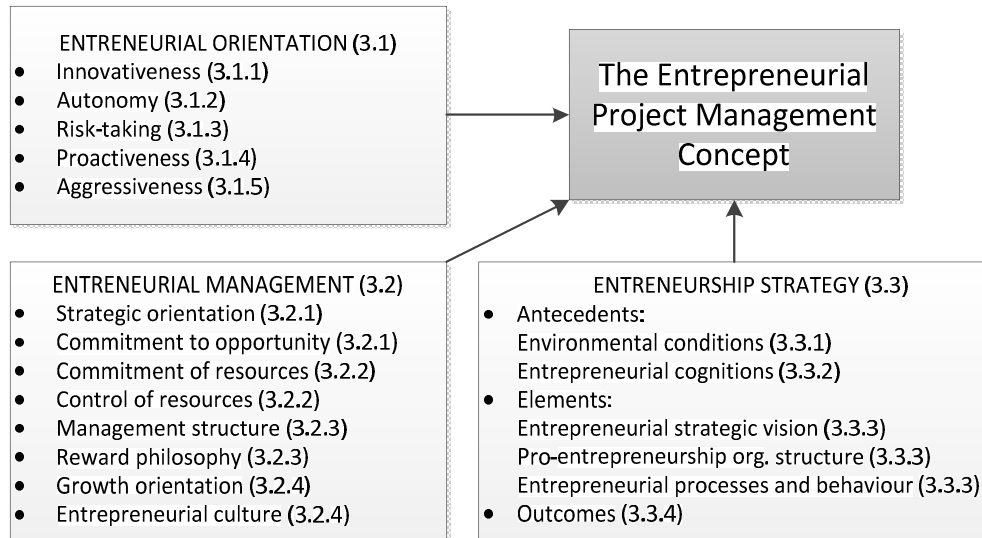


Figure 3.1 The EPM concept development strategy

3.1 Entrepreneurial Orientation in the EPM Concept

The EO concept includes (1) innovativeness, (2) proactiveness, (3) risk-taking, (4) autonomy and (5) competitive aggressiveness components as fundamental measures in determining the entrepreneurial posture of an organisation. It is the most widely used and established tool for researching organisational entrepreneurship (Brown, Davidsson and Wiklund, 2001).

3.1.1 Innovativeness in the EPM Concept

In the EO concept an organisation is considered very innovative if it continuously releases new and/or breakthrough products or services, opens new markets, favours experimentation and original approaches to problem solving, designs unique processes and methods of production, etc. (Lumpkin, 2009). Most of these outcomes are achieved through projects themselves and thus are not directly applicable measures for the EPM concept. It is not the innovativeness of an outcome that is of interest, but rather how facilitating the project climate is for developing innovation. Fortunately, there are means to measure climate in project team and its embeddedness to external project environment that either foster or impede innovation.

Ekvall (1996) introduced ten organizational climate factors that foster creativity and innovation: (1) challenge, (2) freedom or autonomy, (3) idea support, (4) trust and openness, (5) dynamism and liveliness, (6) playfulness and humour, (7) debates, (8) conflicts, (9) risk taking and (10) idea time. He argued that innovative organization, which is defined as having the ability to “adapt itself and its operations to new demands from its environment” (Ekvall, 1996, p. 113), will have higher scores on these factors as compared to stagnant organization, except for conflict which should be lower, because constant conflicts impede idea sharing. With some minor exceptions the conducted study proved these arguments to be right: innovative organizations scored consistently higher on these dimensions. In one case, the pushy management style of a top manager in an innovative organization led to observe high level of conflict and low level of trust, but other aspects were as predicted. Ireland, Kuratko and Morris (2006) use similar climate factors to analyze organizational health for entrepreneurship and innovation.

In addition to the climate factors, innovation is also stipulated by the level of networking and collaboration external to the project team (Wallin *et al.*, 2011; Cummings and Pletcher, 2011). Networking is also an important aspect for conducting entrepreneurial activities (see Section 2.2). Cummings and Pletcher (2011) illustrate how project team’s networking activities improve project innovation level by bringing in ideas of individuals from outside the project team. Wallin *et al.* (2011) suggest measuring innovation capabilities in product-service system development by the extent of the project team’s collaboration on eight different aspects, including collaboration within the company, group, with suppliers and others.

3.1.2 Autonomy in the EPM Concept

Autonomy in the EO concept is a measure of work discretion, authority and decision making power provided to individuals and teams in an organization (Lumpkin, 2009). In other words, it is the level of organizational decentralization. In the project management context autonomy factor can be applied directly from two perspectives: (1) project manager’s job discretion and (2) autonomy provided to project teams and individual members to make decisions and choose appropriate work methods. Hoegl and Parboteeah (2006) prove that innovation project’s team autonomy over operational project decisions is positively related to teamwork quality. It was argued that the project manager’s entrepreneurial outcome is his/her changes made to project management processes, tools, procedures in order to improve project delivery (see Section 2.5). This would be impossible if a project manager had no freedom to choose what management approach, tools, etc. to use.

3.1.3 Risk-Taking in the EPM Concept

Taking risks enables opportunities (Kwak and Laplace, 2005). Risk taking in the EO concept measures organization’s proclivity towards making somewhat bold moves, like borrowing heavily, venturing into unknown or undertaking risky projects (Lumpkin, 2009). So it is rather organization’s likelihood to choose risky project over more certain project. It does not directly imply proclivity towards risk taking during

project delivery itself. Wilemon and Cicero (1970; in Kwak and Laplace, 2005) define two categories of risks that project manager's are concerned with the most. Firstly, it is the risk that goals of the project are not achieved in terms of time, cost and performance. Secondly, they are concerned with risks related to professional career advancement. Both types of risks influence how project managers approach their work. Kwak and Laplace (2005) argue that when project's time-to-market is important, taking risks is imperative to ensure fast project delivery. In addition, a growing complexity of a project and its environment pose risks that are hard to foresee despite planning and evaluation efforts. In such cases, searching for opportunities to improve project delivery becomes a major concern, rather than risk identification and mitigation (Jaafari, 2001). Therefore, risk tolerance or proclivity towards calculated risk taking in order to keep projects on track and opportunity search for project delivery improvement are elements of the EPM concept.

3.1.4 Proactiveness in the EPM Concept

Proactiveness in the EO concept measures organization's position towards being market leader in introducing new products and services, anticipating future demands and seeking new opportunities (Lumpkin, 2009). Obviously, this conceptualization of proactiveness does not directly apply to project management context. Proactiveness in general and at all levels, whether it is organization, team or individual, is characterized as future-orientated and self-starting behaviour to change or take charge of the external environment and it plays a major role in the process of innovation (Strauss, Griffin and Rafferty, 2009; Williams, Parker and Turner, 2010). The antecedents of proactive behaviour lie within individual characteristics towards proactiveness and contextual factors that either impede or foster proactive behaviour (Strauss, Griffin and Rafferty, 2009). For the purpose of constructing the EPM concept, the contextual factors that can be managed to foster proactive behaviour are of the most interest.

There is a handful of research that focuses on examining contextual factors of proactive behaviour in the work environment. Parker, Turner and Williams (2006) modelled and tested the antecedents of individual proactive behaviour. Their findings suggest that proactive behaviour is fostered by the following contextual factors: (1) flexible role definition, (2) job autonomy and (3) co-worker trust. In addition, Williams, Parker and Turner (2010) when investigating team-level proactive behaviour found that teams which had greater autonomy over day-to-day tasks were more likely to engage in proactive problem solving and innovation. What is more, when the time span between the proactive action and future condition that is to be affected by that particular action is short, real-time communication focused on real-time project events is vital to enable proactive and self-organizing behaviour (Brown and Eisenhardt, 1998). Another factor that was included in the initial study by Parker, Turner and Williams (2006) but found to be insignificant was supportive supervision. They concluded that supportive supervision is mediated by job autonomy. Subsequent researches focused on transformational leadership rather than supportive leadership as a significant factor for stimulating proactive individual and team behaviour (Strauss, Griffin and Rafferty,

2009; Williams, Parker and Turner, 2010). Jaafari (2003) also emphasizes the importance of transformational leadership when managing complex projects in turbulent environments, further discussed in Section 3.3.2.

3.1.5 Aggressiveness in the EPM Concept

The last element of the EO concept is competitive aggressiveness, which was separated from proactiveness by Lumpkin and Dess (1996) (see Section 2.4.1). It measures firm's aggressiveness towards competition. The aggressiveness components that can be applied to project management context are willingness to try *unconventional* methods for project delivery and setting and pursuing ambitious goals and/or deadlines.

3.1.6 Entrepreneurial Orientation of the EPM Concept

Figure 3.2 shows the adapted elements from the EO concept and their relation to the EPM concept. It will later constitute an element of the full EPM concept.

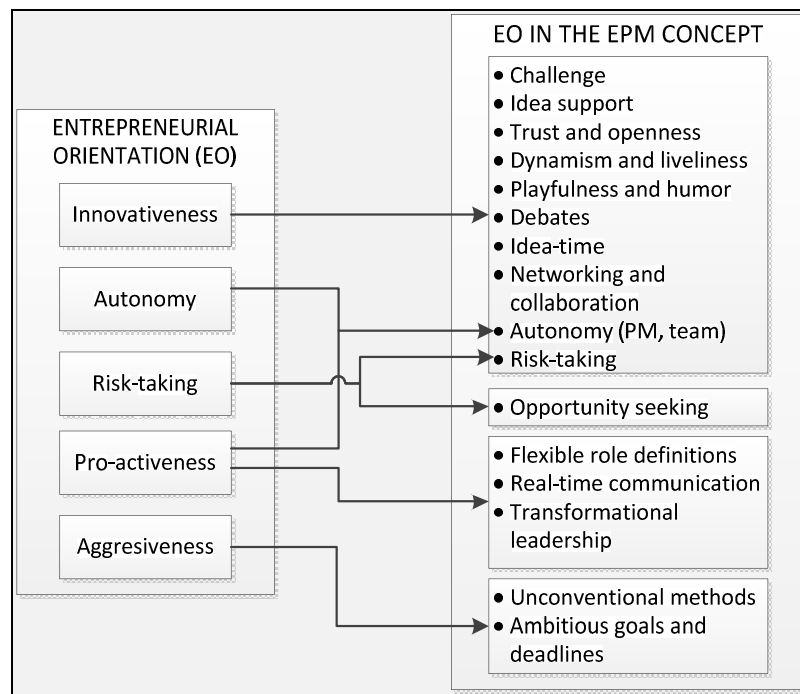


Figure 3.2 The elements of EO in the EPM concept

3.2 Entrepreneurial Management in the EPM Concept

The EM concept is built around following dimensions: (1) strategic orientation, (2) commitment to opportunity, (3) commitment of resources, (4) control of resources, (5) management structure, (6) reward policy, (7) growth orientation and (8) entrepreneurial culture (see Section 2.4.2). These dimensions are discussed by comparing the management approach from entrepreneurial (*promoter's* extreme) and administrative (*trustee's* extreme) perspectives. The possible use of these dimensions in the EPM concept is considered. It is important to mention that innovation and risk are not one of the focal points of this concept, whereas in the EPM concept fostering

innovation and taking risks are considered to be important aspects. Brown, Davidson and Wiklund (2001) proved empirically that this concept only partly overlaps with the EO concept. The same cannot be said about the model adapted to the project management context.

3.2.1 Strategic Orientation and Commitment to Opportunity

Strategic orientation of an entrepreneurial organization is driven by its perception of opportunity, regardless of resources under control, whereas administratively managed firm is resource-driven and limits its search for opportunities in regards to resources under control (Stevenson, 1999). The trustee's commitment to opportunity is based on rigid analysis and once the decision is made it involves large initial investment with a long-term intention to remain in that business. In contrast, the promoter is action-oriented and is able to commit to opportunity quickly, as well as leave it fast if expectations are not met. These two dimensions are by nature strategic and would be especially interesting for analysing entrepreneurial versus administrative project portfolio management, since it could be applied directly. Nevertheless, parallels to project management context can also be found.

Similar contrast exists in project management between planned and emergent styles (Lewis *et al.*, 2002). In this research, plan-driven project management, which is concerned with productivity and efficiency, is argued to be an administrative approach to project management. In contrast, emergent project management style, which is focused on fostering creativity and innovation, is argued to be an entrepreneurial management style. Lewis *et al.* (2002) provide a comparison of these styles by contrasting their approach to monitoring, evaluation and control of projects.

Project progress is tracked by monitoring activities. Plan-based management style emphasizes monitoring project milestones. Revisiting Jelinek and Schoonhoven (1990) the authors argue that milestones "convert project strategy into analyzable technical, budgetary, and time-related objectives" (Lewis *et al.*, 2002, p. 550). In contrast, an emergent style emphasizes tracking project progress by monitoring understandings, which reflects team members' experiential learning, skill and knowledge development. It aids team's sense making process, helps them innovate and elaborate on ideas, translate ideas into goals or a vision, also benefits team's relationship by building common understanding.

Evaluation is a process by which project's value is appraised. A planned approach to project evaluation is carried out in a systematic way through formal reviews by senior management or project governance board, which acts as a gatekeeper making go/no go decisions and providing formal feedback. In an emergent management style, projects are evaluated by teams gathering information from external sources. It is a team boundary crossing networking activity that may help gain organizational support, shape expectations or can lead teams to improvisation and breaking out of existing mind-sets.

Project control is a fundamental tool for decision making. A planned approach to control is directive, where project and senior managers provide guidance and support

for the project to be finished on time, within budget and they make sure that it complies with initial design requirements. An emergent style fosters participative control, which offers the freedom to challenge existing ideas and solve problems in regards to product design and work methods. It helps teams build trust and redefine their own roles, also helps improvisation since teams are not guided by rigid adherence to plans.

Clearly, an emergent style represents characteristics strongly associated with entrepreneurship, since it fosters creativity and innovation through team autonomy, fluid role definitions, information sharing and gathering through networking, etc. On the other hand, a plan-driven style is an administrative tool based on analytic and systematic approach to project management. Lewis *et al.* (2002) research demonstrates that successful project management in product development requires managers to use both approaches concurrently and/or interchangeably, the fact which is in line with Stevenson's (1999) argument that entrepreneurial management is not an extreme case, but management approach which consistently falls at the end of the spectrum, implying a certain combination of entrepreneurial and administrative management styles.

In conclusion, the current author sees planned and emergent styles as representing two contrasting strategic orientations towards project management and commitment to opportunity delivery. An emergent style embodies entrepreneurial values, whereas planned style is an administrative tool.

3.2.2 Commitment and Control of Resources

The entrepreneurial commitment of resources for the pursuit of opportunity is multistaged with a minimum commitment at each stage or decision point, or as Stevenson (1999, p. 13) puts it: “[e]ntrepreneurial management requires that you learn to do a little more with a little less”. Entrepreneurial way of assigning resources is beneficial in turbulent and unpredictable environmental conditions. The administrative commitment of resources, on the other hand, is carefully analyzed and large commitment is made after the decision in order to minimize risk of failure. Also, entrepreneurially managed organization is concerned with ability to use, exploit and/or extract value from resources, rather than owning and controlling them. Its resources are likely to be borrowed, rented or outsourced. In contrast, administrative management is concerned with complete ownership and control of resources.

The main characteristic of entrepreneurially managed resources is their flexibility. Project budget is one of the main resources that project managers are in charge of. In the strictly planned project management approach budget is constructed and frozen after rigid analysis, with possible contingencies taken into consideration (*PMBOK*, 2008). Meeting pre-planned budget is a major concern for project managers. In the emergent style, on the other hand, project budget is difficult to determine with certainty before hand, because of high uncertainty and emerging opportunities. In the entrepreneurial approach, the value of emerging opportunities determines the need to increase the budget or close the project (Cohen and Graham, 2000). Thus, project budget flexibility

is a variable of the EPM concept where more flexible budget denotes entrepreneurial approach.

Outsourcing project activities to external organizations is not a new concept. Consulting organizations exist that can provide specialized resources to projects. Some larger organizations run internal resource markets, which enable quick acquisition of resources when necessary. There are definitely means available for projects to rent, borrow or use outsourced resources to ensure flexibility at all times. In addition, flexibility of the resources can be measured by the adherence to meet projected schedules. In the competitive environments project's time-to-market is an advantage. Eisenhardt and Tabrizi (1995) report on Vesey's (1991) research of high-tech projects, where he finds that being late to market by 6 months, but within budget, reduced product's profitability by 33 percent if compared with on time projects. On the other hand, projects that entered market on time, even with 50 percent over budget, were only 4 percent less profitable. In addition, the authors argue that lengthy development process wastes resources on changes, peripheral activities and mistakes. Thus, it is important that aggressive project schedule controls the need for project resources as opposed to project resources being in control of project schedule.

3.2.3 Management Structure and Reward Philosophy

The promoter's organization is structured organically with multiple informal networks (Stevenson, 1999; Brown, Davidsson and Wiklund, 2001). The purpose of this structure is to manage resources that are not under direct control and have considerable autonomy, also to increase flexibility and create an environment that facilitates exploration and exploitation of emerging opportunities. It is not concerned with following rules and procedures as much as it is concerned with getting things done. The trustee's organization, on the other hand, is structured in a formal way, with clear lines of authority, highly routinized work, productivity measurement systems and so forth. Promoters reward teams and individuals for the value they create to the firm, whereas trustees compensate individually for seniority and the number of resources under control.

The outlined management structures can be directly applied to the EPM concept for determining the proclivity towards entrepreneurial or administrative management style. Reward philosophy could also be applied directly to determine how project members and teams are compensated for their work. However, in the current author's opinion, the more relevant topic to the project management discipline and related to reward philosophy is how the success of a project is measured. Following the logic of entrepreneurial management, the success of a project should be measured by the value it creates to business, its customers, end-users, society, etc. On the other hand, administrative approach should value the classical project success measures in terms of meeting predetermined budget, time and requirement constraints.

3.2.4 Growth Orientation and Entrepreneurial Culture

When developing entrepreneurial management research tool Brown, Davidsson and Wiklund (2001) identified different views on the pace of growth and culture towards idea generation between entrepreneurial and administrative organizations. The promoter's organization is concerned with achieving rapid growth, whereas the trustee keeps growth at slower and steady pace in order to sustain control and avoid risks. The entrepreneurial culture emphasizes strongly the value of new ideas, which are always sought out and shared. The administrative culture, on the other hand, limits the number of ideas to consider in regards to resources under control and may even lack profitable ideas. These two aspects of the EM concept can be regarded as being the outcomes of different management approaches. The purpose of this research is not to measure the outcomes of the EPM concept, thus, for the time being, these two aspects are neglected in this conceptualization.

3.2.5 Entrepreneurial Management in the EPM Concept

Figure 3.3 illustrates the adapted dimensions of the EM concept to the EPM concept and respective management approaches of entrepreneurial and administrative extremes. The dimensions of 'strategic orientation' and 'commitment to opportunity' were merged together under 'strategic orientation' title, as well as 'commitment of resources' and 'control of resources' were merged together under 'resource orientation' title.

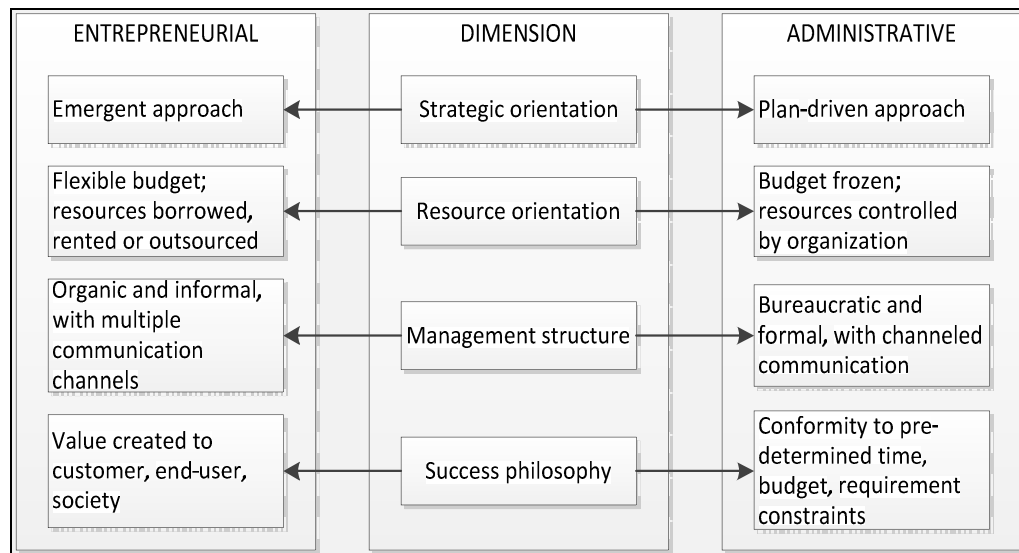


Figure 3.3 The dimensions of EM in the EPM concept

3.3 Entrepreneurship Strategy in the EPM Concept

The purpose of this section is to put together the EPM concept following Ireland, Covin and Kuratko's (2009) approach when conceptualizing the knowledge of corporate entrepreneurship into distinctive strategy. The proposed concept of EPM can also be regarded as a distinctive strategic approach to managing innovation projects in

turbulent and unpredictable environments. As presented in Section 2.4.4, corporate entrepreneurship strategy (CES) contains three main parts: (1) antecedents of CES, (2) elements of CES and (3) outcomes or consequences of using CES. This chapter discusses these parts in the EPM context.

3.3.1 The Antecedents of EPM: Environmental Conditions

Ireland, Covin and Kuratko (2009) emphasize the conditions of external environment that push organizations to employ CES. In particular, they identify four main attractors: *competitive intensity*, *technological change*, *product-market fragmentation* and *product-market emergence*. In project management context, this dissertation defines environmental conditions in terms of different project types, which are further presented in Chapter 4. The four main dimensions denote environmental conditions under which projects are delivered: (1) *novelty* of project outcome, (2) high-tech vs. low-tech *technology*, (3) *complexity* of the scope and (4) *pace* of the project. These dimensions, as is argued and hypothesized in Chapter 4, influence the level of EPM observed in project organization.

3.3.2 The Antecedents of EPM: Entrepreneurial Cognitions

The second antecedent of CES is individual entrepreneurial cognitions, which are defined as “the knowledge structure that people use to make assessments, judgements, or decisions involving opportunity evaluation, venture creation, and growth” (Mitchell *et al.*, 2002; in Ireland, Covin and Kuratko, 2009, p. 26). The authors emphasize the importance of individual’s beliefs, attitudes and values towards entrepreneurship in the CES concept. However, these entrepreneurial cognitions are more significant to a project portfolio manager when making project identification and selection decisions, rather than to a project manager delivering entrepreneurial projects. Jaafari (2003) presents cognitive characteristics necessary for a project manager running complex projects in complex environments.

Jaafari (2003, p. 55) argues that project managers that undertake complex projects in complex environments must embrace creative-reflective (as opposed to rational process-driven) approach to managing projects through which they can “achieve breakthrough solutions to optimally respond to both environmental and project complexity”. According to him, these project managers are necessarily Type 1 personalities of Geyer’s (1998) categorization, where:

1. They will be fully aware that their models are observer-dependent, i.e. they are open to new information from those with different models, and will engage in sufficient amount of self-reference to be at least roughly aware how their own models have originated;
2. They will be sufficiently flexible to realize that their models are not eternally valid, but time-dependent, and therefore should be updated regularly as new information becomes available, or is even proactively sought;
3. Realizing that their models are also problem-dependent, they will certainly not strive to obtain a single, monolithic model of their world, but will develop a set

of different models to deal with different situations (Gayer, 1998; in Jaafari, 2003, p. 55).

A detailed comparison developed by Lester (1994; in Jaafari, 2003) of creative-reflective and rational process-driven project management professionals can be found in Appendix I. It could be used to develop a personality scale, instead of describing extreme case for entrepreneurship as it was done in the developed concept (see Figure 3.4). Jaafari (2003, p. 55) also emphasizes that creative-reflective project managers do not necessarily belong to professional project management associations, but rather “engage in life-long learning and continuous personal development, act autonomously, believe in shared values and follow strong personal ethics”. In addition, he argues that project managers must develop transformational leadership style in order to “allow individuals and organizations to strive on the edge of chaos, inspiring innovation and creativity needed to develop new products and technologies, even new business models that can lead to sustainable competitive advantage in the new economy. The context for transformational leadership includes a kind of visionary acumen that can articulate winning and success in a way that captures imagination of others. In doing so, like-minded contributors can be invited to add their views of the company such that everyone is inspired to do their best work and serve the greater needs of the enterprise and its customers” (Robinson, 2000; in Jaafari, 2003, p. 56). The transformational leadership style is also emphasized in Section 3.1.4, where the antecedents of proactive behaviour are discussed.

3.3.3 The Elements of EPM

The elements of CES are *entrepreneurial strategic vision*, *pro-entrepreneurship organizational architecture* and *entrepreneurial processes and behaviour* (see Section 2.4.4). The element of ‘entrepreneurial processes and behaviour’ is renamed to ‘Entrepreneurial project processes and behaviour’ in order to emphasize project management context. The elements of the adapted EO concept constitute this element, since they define behaviour and processes of an EPM (see Figure 3.4).

The element of ‘pro-entrepreneurship organizational architecture’ in project management context is renamed to ‘Entrepreneurial project management architecture’ and components adapted from the EM concept constitute this particular element of the EPM concept (see Figure 3.4). They represent the same characteristics as described by the CES concept: structural organicity, entrepreneurial culture, reward systems, resources and their capabilities, etc. (see Sections 2.4.4 and 3.2).

The element of ‘entrepreneurial strategic vision’, as presented in Section 2.4.4, signifies the top-management efforts to foster entrepreneurial activities by developing and communicating entrepreneurial strategic vision, creating appropriate organizational structure so that individual entrepreneurial acts can take place and be supported. In project management context this element is renamed to ‘Entrepreneurial project governance’ to denote the appropriate support to the project by the upper management.

The traditional project governance is a tool for project control and decision making by senior management at certain project phases (see Section 3.2.1; *PMBOK*, 2008). It is not to imply that directive control whereby senior managers provide guidance and support is not important. However, following entrepreneurial fashion, it must be lean and of a participative style in order to provide valuable advice and insights, also be able to remove obstacles and roadblocks for project delivery (Brown and Eisenhardt, 1998; Ireland, Kuratko and Morris, 2006). The metaphor for this approach could be seen as an angel investor making an investment into a new venture and making sure it succeeds by providing his/her own knowledge and experience, support and/or network of contacts.

3.3.4 The Outcomes of EPM

Ireland, Kuratko and Morris (2009) distinguish two broad outcomes when organizations employ the CES: (1) the ability to develop new capabilities and knowledge when departing to the unknown and (2) possibility to revise strategy because of the continuous flow of new opportunities. It is argued here, much the same as the authors, that when project manager and project team act in an entrepreneurial fashion, as described in the EPM concept, they are more likely to develop new skills and knowledge, since they are motivated and eager to innovate and try new approaches to problem solving, new ways of working, etc.

Continuous strategic repositioning enables organizational flexibility to adapt to new demands. Much the same, an EPM approach makes project management flexible and quick to respond to customer demands or even proactively seek changes that raise the value of project deliverables. In addition, the other outcomes one may expect to observe can be in terms of improved team work quality, improved project delivery performance and self-organizing behaviour.

Following Teece (2007), these outcomes are titled as ‘Dynamic project management capabilities’, since this approach to project management is a shift from “a well-understood and replicable ‘best’ practices” (Winter, 2003; in Teece, 2007, p. 1321), which cannot possibly constitute competitive advantage of an organization. An EPM approach emphasizes cross-functional project networking, new project management and knowledge transfer routines that according to Eisenhardt and Martin (2000; in Teece, 2007) are important elements of the dynamic capabilities. It is a shift towards creating, deploying and protecting intangible project management capabilities that support dynamic capabilities and competitive advantage of a business organization.

3.3.5 Definition of EPM and Concept Scheme

In this thesis, the EPM is defined by following contingency theories of management whereby organizations that “see their environments as turbulent and complex [...] respond with more complex, organic structures which reflect the variety in the environment” (Ashmos, Duchon and McDaniel, 2000, p. 577). Hereby, the EPM is defined as *a distinctive management approach whereby project and environmental complexity is absorbed by relying on complex entrepreneurial behaviour, processes,*

structure and governance, as opposed to complexity reduction through simple mechanistic and formal project management style. The concept scheme of EPM is illustrated in Figure 3.4.

The current author followed Ireland, Kuratko and Morris (2009) to illustrate the interrelations between different elements. However, the deeper analysis of these interrelations is outside the scope of this research. The focus of this research is to analyze empirically the relation between ‘Project Environmental Conditions’ and elements of the EPM concept. The red line is drawn for the purpose of the thesis research. It does not exist in the original CES model by Ireland, Kuratko and Morris (2009). However, the direct relationship between environmental conditions and management architecture is researched and analyzed in this dissertation.

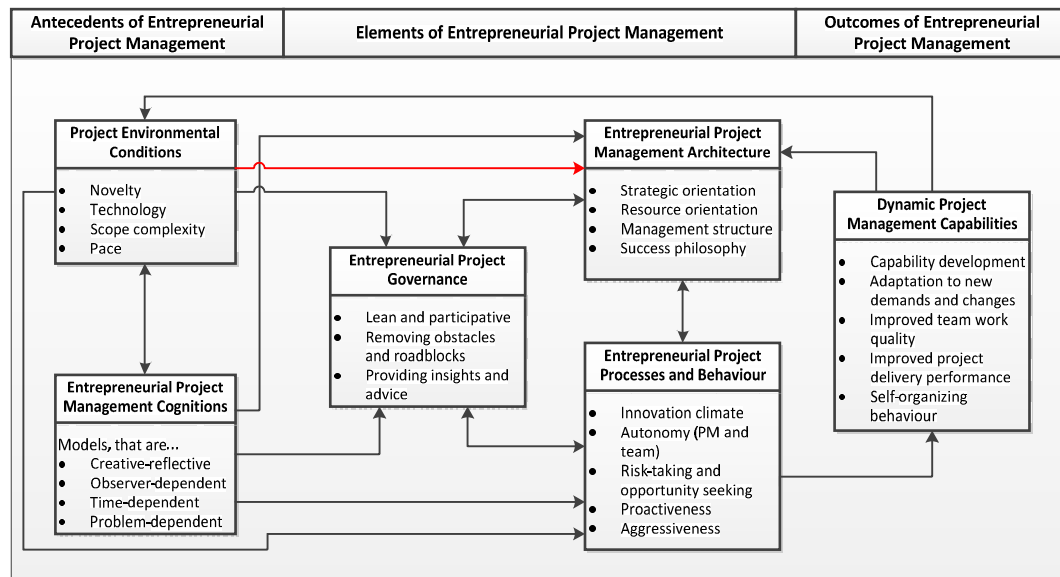


Figure 3.4 The concept of entrepreneurial project management (EPM)

There are certain conditions that push organizations to adopt entrepreneurship concepts to organizational management, for example, rapid change in technology or consumer economics, need for fast decisions and flexibility, high uncertainty, diminishing opportunities and others (Stevenson, 1999). Arguably, the EPM concept does not apply equally to all projects. In the following chapter the existing project classification frameworks are reviewed and the scale of project entrepreneurship level expected in various project types is developed along the selected framework.

4 Project Classification, Entrepreneurship Scale and Research Hypotheses

Projects are by definition unique endeavours and the prevailing assumption that “a project is a project is a project” and that all projects can be managed using the same management approach has been empirically proven to be wrong on many occasions (Williams, 2005). It is also not to suggest that the EPM concept is equally applicable to all types of projects. Entrepreneurship is usually associated with complexity, dynamism and disequilibrium, concerns with innovation and adaptation, and how best to deal with risk, uncertainty and ambiguity (Arend and Chen, 2011). Thus, a project classification framework is necessary against which project entrepreneurship scale can be mapped, indicating the extent of EPM applicability. The selection criteria for classification framework are its ease of use and adequacy to classify projects against entrepreneurial characteristics of innovation, complexity, uncertainty and flexibility.

4.1 Overview of Project Classification Frameworks

Williams (2005) provides short overview of research attempts to define project classification frameworks in order to identify different project management approaches for different types of projects. The following dimensions are used in different classification frameworks to define project type and management style:

- Technological uncertainty and complexity of scope (Shenhar and Dvir, 1996);
- Project goals and delivery methods clarity matrix (Turner and Cochrane, 1993);
- Complexity, pace, novelty and technology (Shenhar and Dvir, 2004);
- Type of error and type of complexity matrix (Lindkvist et al., 1998);
- Complexity and uncertainty/ambiguity (Pich et al., 2002)
- Extent of activity variation and type of uncertainty (foreseen, unforeseen and chaos) (De Meyer et al., 2002);

After closer investigation of the models above, the easiest to use when creating project entrepreneurship scale and most appropriate for measuring entrepreneurial characteristics is the model proposed by Shenhar and Dvir (2004). The foremost reasons to select this model are its universal applicability and it uses the four dimensions to classify projects that are closely related to entrepreneurship characteristics. The model measures *novelty* of the project outcome (market innovation), sophistication of *technology* (uncertainty level), *complexity* of scope and *pace* of project delivery, hence the name NTCP model. Each of these dimensions has at least three well defined scale steps (see Figure 4.1). Each of these dimensions are presented in the following sections and linked to EPM through hypotheses.

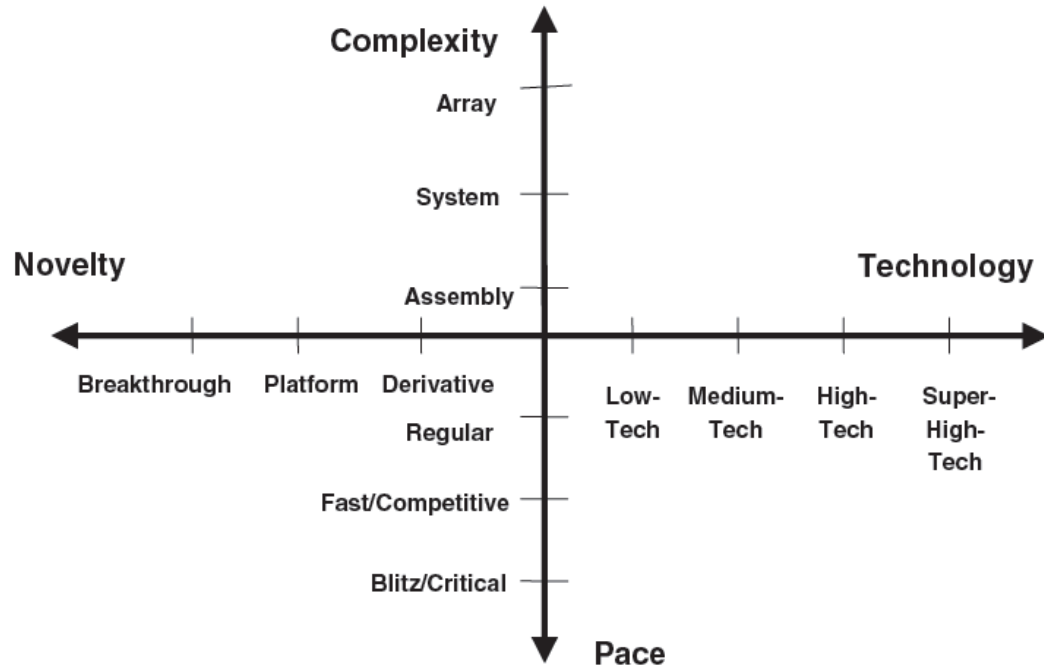


Figure 4.1 The NTCP model for project classification (Shenhar and Dvir, 2004)

4.2 NTCP: Novelty

Dvir and Shenhar (2004) define novelty dimension by how familiar the outcome of the project is to its user, in other words, the level of market innovation. The novelty of the outcome affects the project management approach on the search for necessary market data, product definition and marketing aspects. The three steps in the scale for different novelty levels are: (1) *derivative*, (2) *platform* and (3) *breakthrough*.

Derivative. Extensions and improvements of existing product or service fall under derivative projects. Market data and requirements for the outcome are mostly well known and can be frozen early in the project. Marketing of the product emphasizes improvements and advantages over previous products.

Platform. Projects that deliver new generation products or services to the existing families of products and services are defined as platform projects. The product requirements are not as clear as in derivative type, extensive market research is necessary, thus requirements are completed well in the project execution phase. Marketing focuses on creating brand image, its advantages over competition.

Breakthrough. A new-to-the-world products or services are delivered by breakthrough projects. The project outcome is completely unfamiliar to its user, no market data is available to define product requirements, and thus they remain flexible until late in the project. Experimenting, trial and error, prototyping are common approaches to manage such projects. The marketing of such products and services focuses on attracting early adopters and educating customers of their needs for this new product or service.

Developing innovative and novel products and introducing them to the market is a fundamental aspect of entrepreneurship. Thus, it is hypothesized that:

Hypothesis 1: The evidence of EPM is stronger when the level of project novelty is higher.

Developing new means of production, creating new services and products, opening new markets, etc., are elements that define entrepreneurship (Ahmad and Seymour, 2008).

4.3 NTCP: Technology

The second dimension in the model is technology, which is the major source of uncertainty. The technological uncertainty is determined by the level of new technology used in the project, and whether it already exists or is yet to be developed. Higher uncertainty at project initiation means longer development, later design freeze, more prototyping and testing. Dvir and Shenhar (2004) use four steps to classify projects under this dimension: (1) low-tech, (2) medium-tech, (3) high-tech and (4) super high-tech.

Low-tech. These projects have no new technology involved, only mature and known is used. Projects under this category are an example of ‘painting by numbers’ project type, where the outcome and processes are well known (Maylor, 2010). Management style in these projects is plan driven, command and control, with “a *no-nonsense, no-changes, get-the-job-done* attitude” (Dvir and Shenhar, 2004, p. 1272).

Medium-tech. Besides using existing technology, these projects also incorporate some of the new previously unused technology. As a result, these projects need some additional development and testing, but design and requirements are usually frozen early in the project life-cycle. The management style is less strict at the beginning, with more flexibility, but overall project management is to “limit changes to minimum and freeze as early as possible” (Dvir and Shenhar, 2004, p. 1273).

High-tech. This type of projects includes new, but existing technology, which is integrated together for the first time by the project. These projects require lengthy trial-and-error-based design and development cycles, where design freeze requires at least three development cycles. Management is characterized as relatively flexible, since changes and rework are expected.

Super high-tech. These projects create the new technology, in other words, the necessary technology does not exist at project’s initiation. Most of the efforts are devoted to creating new technology, testing and selecting from the alternatives, requires extensive development and very late design freeze. Management style is extremely flexible since things change very fast, and extensive real-time informal communication is at most importance to keep up with the rate of change.

The uncertainty increases along this dimension, and since it is one of the most important ingredients for entrepreneurship to exist, it is hypothesized here that:

Hypothesis 2: The evidence of EPM is stronger when technological uncertainty is higher.

4.4 NTCP: Complexity of Scope

Dvir and Shenhar (2004) relate project complexity to the scope of project systemization, which is the number of components, modules, elements, subsystems, etc. in the project that must operate as one system. *System scope* determines the way project is coordinated, its communication style (formal vs. informal) and level of necessary documentation. Authors define three system scope levels to distinguish different project management approaches: (1) assembly, (2) system and (3) array.

Assembly. These projects combine a collection of elements into a single unit to perform a single function (e.g., subsystem, coffee machine) and rarely include more than 100 activities in the network. Project execution usually happens under single functional unit or by a small cross-functional team with low formality and bureaucracy. Project management activities are basic and simple.

System. These projects combine a complex collection of elements and interactive subsystems, jointly performing a wide range of functions (aircraft, computer, building, etc.). System-type projects are usually coordinated by a leading organization, with multiple project deliverables outsourced to external organizations and suppliers. These projects exhibit more formality than assembly, may need administrative personnel to take care of the planning, budget maintenance, etc. The number of activities range from a couple of hundreds to a few thousands.

Array. Array-type projects involve a widespread collection of systems functioning together to achieve a common mission (a city's highway system, a national communication network, restructuring of a global corporation, etc.). These projects may be subdivided into several programs coordinated by the central organization. It relies heavily on proprietary bureaucratic procedures.

Literature on entrepreneurship emphasizes decentralization of large organizations in order to achieve a sense of 'smallness' that arguably enables entrepreneurial behaviour evident in small entrepreneurial ventures (Gibb, 2000). On this premise is it hypothesized that:

Hypothesis 3: The evidence of EPM is stronger when scope complexity is lower.

4.5 NTCP: Pace

This scale differentiates projects by time pressure and consequences if time goals are not met. Dvir and Shenhar (2004) distinguish three management styles typical to the following levels of urgency: (1) regular, (2) fast-competitive and (3) critical-blitz.

Regular. The pace of these projects is not critical to organizational success. They are mostly started to achieve long term goals and can be delayed to take care of urgent matters. They are usually managed in a casual format.

Fast-competitive. Time-to-market is a competitive advantage for this type of projects. Managing time and meeting deadlines is usually of the highest priority. In addition, achieving profit goals and addressing market needs are important success criteria.

Critical-blitz. For these projects time is of the most importance and failing to meet time constraints usually means project failure. These projects are managed with very tight schedules and work flow, real-time communication and decision making is continuous, detailed documentation is neglected because of time constraints. Project manager has almost full autonomy and top managers constantly show support and track project progress.

Entrepreneurship caught interest of researchers and organizations that could explain and help in the times of relentless change to adapt and succeed. The more dynamic and hostile the conditions, the more firms will be entrepreneurial (Miller, 1983), thus it is hypothesized that:

Hypothesis 4: The evidence of EPM concept is stronger when time criticality or pace of the project is larger.

4.6 Project Entrepreneurship Scale

Figure 4.2 illustrate the hypothesized project entrepreneurship scale. The complexity scale is reversed to indicate the direction of the rising entrepreneurship level, as compared to Figure 4.1. The most entrepreneurial combination of project factors is denoted by the red line that is assembly, breakthrough, blitz and super-high tech project. The least entrepreneurial project hypothesized is marked by the blue line.

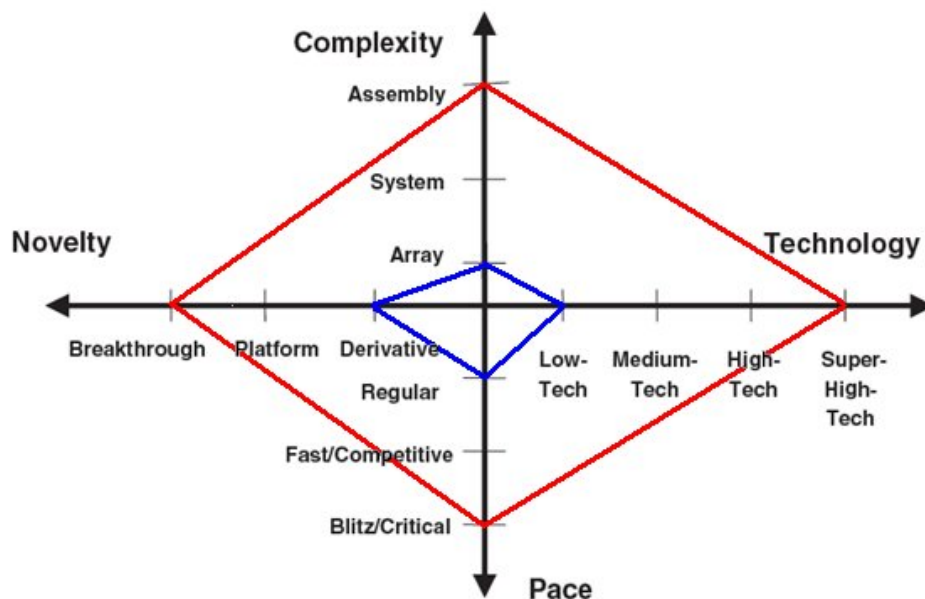


Figure 4.2 Project entrepreneurship scale (red – most, blue – least entrepreneurial projects).

This concludes the development of theoretical project entrepreneurship scale. The next chapter presents the research method applied and its limitations when testing the proposed concept.

5 Research Method

In order to answer the second research question and to test the related hypotheses regarding the extent of EPM along the various project types, a web-based survey was employed to collect results for various project types and measure the elements of the EPM concept. There are several practical reasons to choose a web-based survey approach for data collection (Archer, 2003). First of all, it provides an access to a relatively large number of potential respondents and pool of data, which is necessary to adequately test the hypotheses. Secondly, it is the least expensive and fastest method for obtaining large primary data set. Thirdly, the administration of data is relatively easy when compared to, for example, mail survey or interview data management. However, it has a couple of limitations to consider. First of all, a web-based survey can have a low response rate. Secondly, it is difficult to account for an adequate probability-based sample, especially if access to a survey is difficult to control. These drawbacks make it difficult to generalize the results.

This chapter presents measures used in this research, discusses the characteristics of a research sample, its limitations to the research and presents briefly the data analysis method. In addition, the last section of the chapter analyses and transforms the independent factors used in the research in order to better meet the prerequisites of the ANOVA analysis.

5.1 Research Measures

The questionnaire was designed following guidelines proposed by Malhotra (1999; in Webb, 2000) and discussed by Webb (2000). The developed questionnaire consists of three main parts (see Appendix II). The first seven single choice questions obtain general information about the respondent's organization (industry, size, etc.) and basic project characteristics (budget, team size, etc.). These characteristics are presented in the next section, when discussing research sample. Questions eight to eleven are single choice questions used to determine the respondent's typically managed project type along the dimensions presented in Chapter 4. In addition, after a questionnaire review, several new selection options were added when determining project type (like 'Partnership building or sales related project' and 'None of the above' to the Novelty dimension, see Appendix II).

Questions twelve to sixteen consist of statements that measure the elements of the EPM concept gathered under the following headlines: 'Project Manager's Autonomy', 'Entrepreneurial Project Governance', 'Project Management Structure', 'Project Resource Orientation' and 'Project Success Measures'. Respondents were asked to provide their opinion about the statements on the 7-point Likert scale, where 1 stands for 'strongly disagree', 2 – 'disagree', 3 – 'slightly disagree', 4 – 'not sure', 5 – 'slightly agree', 6 – 'agree' and 7 – 'strongly agree'. In addition, Entrepreneurial Project Governance included 'Not Applicable' selection for cases where stated project governance practice was not performed at all. Also, several statements were reverse coded (see Appendix II).

Project manager's autonomy was measured by seven statements. These statements were adapted from Ireland, Kuratko and Morris's (2006) questionnaire, which was proposed to be used as a tool to audit organizational climate for entrepreneurship and innovation. Five statements were included to measure the proclivity of project governance towards entrepreneurship. These items were created by the current author. Some of the wording styles used to construct the items were also borrowed from Ireland, Kuratko and Morris's (2006) questionnaire.

The questionnaire item 'Project Management Structure' encompasses several elements of the EPM concept. The first four statements measure the 'Management structure' item of the 'Entrepreneurial Project Management Structure' element and were adapted from Brown, Davidsson and Wiklund (2001). The remaining statements measure the element of 'Entrepreneurial Project Processes and Behaviour'. It is noted in the Appendix II which item of this element is measured by the particular statement. In order to keep the questionnaire as short as possible, some of the items were omitted from the questionnaire.

The questionnaire section under 'Project Resource Orientation' consists of three statements to determine budget flexibility, adherence to schedule and resource ownership approach. It is the 'Resource orientation' item of the 'Entrepreneurial Project Management Structure' element. The 'Success philosophy' item of the same element is measured under 'Project Success Measures'. The four different statements illustrating possible success measures were constructed by the current author following Dvir, Sadeh and Malach-Pines (2006). The 'Strategic orientation' item of the 'Entrepreneurial Project Management Structure' element was not included in the questionnaire, since it requires a large set of statements to be determined exactly and would complicate the questionnaire and research significantly.

The questionnaire was tested for clarity by asking three known respondents to provide the feedback about the questionnaire by following the approach suggested by Webb (2000, p. 215):

- the meaning of the questions is clear,
- the questions are easy to answer,
- the questions flow logically from one another,
- the routing/branching instructions are clear,
- the questionnaire is too long,
- the questionnaire engages and retains the respondent's interest.

Subsequently, the questionnaire was revised and dubious or misleading questions were clarified.

5.2 Research Sample

The research sample consists of 83 responses to the online research questionnaire by project managers, who were reached through several channels. First of all, invitation letter to participate in the research was sent by e-mail to around one hundred

representatives of organizations listed in the event book of Chalmers University of Technology career days. They were asked to forward the provided link to the questionnaire to project managers of their organization. 17 answers were collected through this channel. Secondly, the research was advertised on the www.projectmanagers.net web page. It has over thirty two thousand registered members. A series of blog posts were featured on the main page describing the EPM concept and research. A link was provided to the questionnaire at the end of each post inviting to take part in the research. 37 responses were received through this channel. The last channel included sending out research invitations to project managers through personal connections. 29 responses were obtained through this channel.

The diversity of sample collection methods, the low number of responses and the lack of control of access to the questionnaire prevents the current author from making any generalizations. All the conclusions made will be applicable to the accumulated research sample only. Table 5.1 presents basic characteristics of the research sample.

Table 5.1 Characteristics of research sample

		Frequency	Percent
Industry	Automotive & Aerospace	6	7.2
	Banking & Finance	9	10.8
	Telecommunications	5	6.0
	IT Services/Software	23	27.7
	Engineering & Construction	14	16.9
	Manufacturing	8	9.6
	Other/Missing Data	18	21.7
Age of organization	Up to 5 years	9	10.8
	6 to 20 years	31	37.3
	21 to 50 years	15	18.1
	Older than 51 years	28	33.7
Size of organization	Less than 20 employees	11	13.3
	20 to 50 employees	5	6.0
	51 to 250 employees	15	18.1
	More than 250 employees	49	59.0
	Missing data	3	3.6
Project management experience	Less than 1 year	4	4.8
	1 to 3 years	10	12.0
	4 to 7 years	19	22.9
	More than 7 years	48	57.8
	Not in project management	1	1.2
	Missing data	1	1.2
Average project budget	Less than 100 000 EU	16	19.3
	100 000 to 500 000 EU	33	39.8
	500 000 to 1 500 000 EU	18	21.7
	More than 1 500 000 EU	15	18.1
	Missing data	1	1.2

Average project duration	1 to 3 months	7	8.4
	3 to 9 months	30	36.1
	9 to 18 months	35	42.2
	More than 18 months	11	13.3
Size of core team	1 to 5 persons	34	41.0
	6 to 10 persons	29	34.9
	11 to 20 persons	11	13.3
	More than 20 persons	9	10.8

The research sample comes predominantly from the IT services and software industry, accounting for almost 1/3 of the sample. 40 organizations are up to 20 years old and 43 organizations are older than 21 years. Almost 2/3 of the sample consists of large organizations with more than 250 employees.

Project managers of the sample are mostly very experienced with more than 7 years of project management experience (57.8%). 22.9% of the respondents have experience lasting from 4 to 7 years, and 16.8% of respondents have less than 3 years of project management experience. Most of the projects they run have a budget between 100 000 to 500 000 EU, but the sample represents other budget sizes well too. Most of the sample projects are either 3 to 9 or 9 to 18 months long (36.1% and 42.2% respectively). Small project teams with 1 to 5 persons account for 41.0% of the sample gradually decreasing to 10.8% of core project teams having more than 20 members. Overall, the collected sample represents a wide range of possible project contexts and industries.

5.3 Data Analysis Method

The obtained research data was analyzed using SPSS v.19 software tool for statistical analysis. In order to test the hypothesis, factorial ANOVA was conducted. It allows extracting the effect that one of the several independent factors has on a single dependant factor, while accounting for the effect of other independent factors (Field, 2005). The dependent factors are represented by the elements of EPM, whereas the independent factors were played by the project's environmental conditions defined by novelty, technology, pace and complexity. In order to adequately use factorial ANOVA analysis method, the data set has to meet several initial conditions (Field, 2005):

- Data is normally distributed;
- Variance in each experimental condition is fairly equal;
- Observations are independent;
- The dependent variable is measured on at least an interval scale;

Whether the data set meets the condition of normal distribution can be examined by the Kolmogorov-Smirnov and/or Shapiro-Wilk tests (Field, 2005). These tests compare the collected data set with the data set which is normally distributed, has the same mean and standard deviation as the collected data set. If the test is not significant then it tells us that the collected data set is not significantly different from the normally

distributed data set and can be held to be normally distributed. This assumption is tested for separate data analysis groups and is presented in the next chapter and Appendix III when presenting research results. In this research, the Shapiro-Wilk test is used as a decision reference, since it is better suited for small sample sizes (Razali and Wah, 2011). Throughout the analysis, the result is held significant if $p < 0.5$, as it is the most common value used in the social science research (Field, 2005).

The equality of variance is measured by the Levene's test (Field, 2005). It tests the hypothesis that the data set for each experimental condition has equal variance. Therefore, if the test is not significant ($p > 0.5$) the hypothesis cannot be dismissed and the assumption of equal variances is held to be true. This test is performed for each data analysis group in the next chapter.

The third assumption of the independence of observations cannot be guaranteed with certainty because of data collection method employed in this research. It is impossible to guarantee that the data collected is not from dependent sources, as the access to the questionnaire was loosely controlled in order to gather as much data as possible. In the case of correlated data between observations (dependent observations) the Type I error rate may be larger than the expected 0.05 (Field, 2005). Thus, the reader of this thesis is cautioned to use his/her discretion when reading the research results. In addition, as mentioned before, the results are by no means generalized.

In the case of this research, the dependent variables were measured on the 7-point Likert scale, which is an interval scale and ANOVA analysis can be applied (Carifio and Perla, 2008). The 7-point Likert scale was transformed to 6-point Likert scale by excluding 'Not sure' selections in order to include only certain results, since 'Not sure' selection in reality may represent a totally different scenario. The same was done with 'Not applicable' selection in the case of "Project governance".

When performing four-way ANOVA analysis it is possible to analyze higher order interactions, like what is the combined effect of novelty and technology on project manager's autonomy. This kind of analysis is outside the scope of this research.

In the next section, due to a relatively small research sample, independent variables of project's novelty, technology, pace and complexity are analyzed and transformed to meet the requirements of independent factorial ANOVA analysis.

5.4 Transformation of Independent Factors

The four independent factors used in the factorial ANOVA analysis require a large research sample. The rule of thumb, recommended by Wilson Van Voorhis and Morgan (2007), when performing ANOVA analysis is to have a cell size of 30 samples and if reduction is necessary, no less than 7 samples per cell. The number of cells is determined by the number of independent factors and the number of levels in each factor. In this research, there are four independent factors (novelty, technology, pace and complexity) and all together they have $3+4+3+3=13$ levels (i.e., novelty = [derivative, platform, breakthrough]). Thus, if the modest requirement of 7 samples per

cell is taken, the research sample needs to consist of at least $13 \times 7 = 91$ responses. It is also assumed that the collected data is equally distributed over each cell, which can hardly be true in reality. Therefore, effort to reduce the research sample is necessary and performed as shown in Table 5.2.

Table 5.2 Level reduction of project type dimensions

Dimension	#	Level	Frequency	#	Frequency
Novelty	1	Derivative	35	1+5	40
	2	Platform	28	2+3+4	43
	3	Breakthrough	10		
	4	Partnership building and sales related	5		
	5	Other	5		
Technology	1	Low-tech	5		
	2	Medium-tech	34	2+1+5	41
	3	High-tech	34	3+4	42
	4	Super high-tech	8		
	5	Other	2		
Pace	1	Regular	9		
	2	Fast/Competitive	37	2+1	46
	3	Blitz/Critical	37	3	37
Complexity	1	Assembly	25	1	25
	2	System	50	2+3	58
	3	Array	8		

In the novelty dimension, selection ‘other’ was merged with the ‘derivative’ level, assuming a low level of market novelty for projects selected as ‘other’. ‘Breakthrough’ and ‘partnership building and sales related’ projects were merged with ‘platform’ projects, since they have higher levels of market novelty than ‘derivative’ projects. ‘Regular’ pace projects were added to ‘fast/competitive’ project type, since their pace is lower than ‘blitz/critical’ type of projects. ‘Array’ level of complexity was combined together with ‘system’ as they have higher complexity level than ‘assembly’.

With this kind of level reduction, the minimum sample size, if distribution over cells is equal, is reduced to $4 \times 2 \times 7 = 56$ samples. Therefore, probability is increased to meet the required condition of at least 7 samples per cell when performing factorial ANOVA analysis with the research sample of 83 responses.

Although reduction was performed, analysis of sample distribution between cells for different experimental conditions revealed that there are cell sizes with less than 7 elements. In addition, due to the unbalanced model (unequal cell sizes) mean values used by ANOVA analysis to compare different group means can be different from the real means, because ANOVA analysis performed employs unweighted means (Field, 2008). This way, the cell sizes are artificially balanced out by discounting different sample sizes per cell when calculating mean values. Due to the fact, that the analysis model does not always meet the required conditions and is unbalanced, the effects of factors are also compared by performing the independent t-test or Mann-Whitney test (in case of not normally distributed data) to either support or deny the result of the ANOVA analysis.

6 Research Results

In this chapter the research results are presented for five different dependent variable groups: (1) project manager's autonomy, (2) project governance, (3) project management structure, (4) project resource orientation and (5) project success measures. Items used to measure project manager's autonomy and project management structure were loaded on single factors respectively, since the analysis of the scale resulted in Cronbach's alpha larger than 0.7 (Field, 2005). Items of the other groups were analysed separately (Cronbach's alpha < 0.7). Table 6.1 presents the overview of significant ($p < 0.5$) and potentially significant ($p < 0.2$) results if a larger research sample could be obtained in a better controlled research environment. The colour coding of the independent factor signifies its adherence to the hypothesized entrepreneurial direction (green – follows, orange – does not follow hypothesis). In order to make the report reader friendly, full results of the main effects are presented only for project manager's autonomy (see Table 6.2) and other results for each dependent factor are presented in Appendix III.

Overall, the analysis of the data resulted in six significant (bold coding) and ten potentially significant effects out of the 56 possibilities. Seven results follow the hypothesized directions, whereas nine results are against the hypothesis. The following sections present and briefly discuss results for each dependent variable groups. Discussion on how these results meet the hypotheses is carried out in the final chapter.

Table 6.1 Summary of significant and potentially significant effects

Independent Factor	Level	Shap.-Wilk p	Mann-Whitney			Factorial ANOVA ^{a,b,c}				
			Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	η^2
Project Governance										
Dependent Variable: [EPG] Upper mgmt. makes pj. decisions by following simple rules and procedures										
Technology	Medium	.001	3.667	1.628	.350	3.717	.291	2.206	.143	.034
	High	.000	3.368	1.618		3.173	.330			
Complexity	Assembly	.002	3.000	1.842	.067	2.962	.353	5.586	.021	.083
	System	.000	3.755	1.466		3.902	.269			
Dependent Variable:[EPG] Sr. mgrs. support my project by removing obstacles and roadblocks										
Pace	Fast	.001	4.023	1.354	.308	3.938	.244	2.658	.108	.040
	Blitz	.000	3.667	1.309		3.384	.291			
Dependent Variable:[EPG] Pj. gov. provides valuable insight and advice										
Novelty	Derivative	.002	4.412	1.158	.099	4.145	.250	4.972	.030	.079
	Platform	.015	3.897	1.334		3.785	.239			
Technology	Medium	.013	3.909	1.422	.264	3.676	.244	6.224	.015	.097
	High	.004	4.325	1.118		4.269	.243			
Complexity	Assembly	.092	3.727	1.638	.157	3.479	.293	2.255	.139	.037
	System	.001	4.314	1.049		4.368	.198			

Dependent Variable:[EPG] Pj. gov. imposes simple procedures to follow										
Pace	Fast	.007	3.628	1.496	.050	3.837	.280	3.149	.081	.047
	Blitz	.005	2.972	1.424		2.904	.296			
Dependent Variable: [EPG] Pj. mgr. and team decide how to report pj. achievements										
Complexity	Assembly	.075	3.682	1.524	.045	3.607	.340	2.991	.089	.046
	System	.000	4.400	1.226		4.341	.218			
Project Management Structure										
Dependent Variable:[PMS] Project management structure										
					Independent t-test	Factorial ANOVA				
Technology	Medium	.089	4.069	.649	.242	4.033	.126	1.790	.185	.026
	High	.207	4.246	.718		4.258	.139			
Project Resource Orientation										
Dependent Variable: [PRO] Once pj. budget is finalized, it is easy to review										
					Mann-Whitney	Factorial ANOVA ^{a,b,c}				
Pace	Fast	.008	3.272	1.500	.236	3.243	.243	2.018	.160	.032
	Blitz	.022	2.848	1.372		2.941	.290			
Dependent Variable: [PRO] Pj. schedule controls pj. resources										
Novelty	Derivative	.000	3.794	1.225	.071	3.835	.241	3.557	.064	.057
	Platform	.001	4.275	1.358		4.503	.264			
Pace	Fast	.002	3.750	1.410	.041	3.711	.265	4.320	.042	.068
	Blitz	.001	4.412	1.104		4.612	.246			
Dependent Variable: [PRO] Pj. resources are rented, borrowed or outsourced										
Novelty	Derivative	.000	2.629	1.416	.024	2.714	.272	2.505	.119	.041
	Platform	.003	3.368	1.460		3.175	.287			
Complexity	Assembly	.005	2.682	1.460	.183	2.707	.332	2.742	.103	.045
	System	.000	3.157	1.475		3.181	.233			
Project Success Measures										
Dependent Variable: [PSM] Against business value added										
Complexity	Assembly	.046	3.640	1.381	.030	3.733	.289	6.804	.011	.099
	System	.000	4.365	1.329		4.642	.236			

6.1 Results for Project Manager's Autonomy

Table 6.2 presents the results for project manager's autonomy against each of the independent factor. Overall, none of the main factors reached significant effect on project manager's autonomy ($p > 0.05$). The technology factor has the effect on autonomy closest to significance ($p = 0.248$) and it is able to explain 2% of variance in project manager's autonomy ($\eta^2 = 0.02$), which is a relatively low level of explanation. Project managers working on high-tech projects enjoy more autonomy (mean 4.108), whereas medium-tech managers have it lower (mean 3.888). The independent t-test

analysis for the technology factor provides a similar result. It is partly significant at 0.1 level if considering 1-tailed significance for hypothesized values (p (1-tailed) = p (2-tailed) / 2 = 0.112). Other main factors did not show strong effects on project manager's autonomy ($p > 0.4$). Overall, the full model employed, considering higher-level interactions, accounts for 10% of variability in project manager's autonomy (R Squared = 0.1).

Table 6.2 Main effects of independent factors on project manager's autonomy

Dependent Variable:[PMA] Project manager's autonomy										
Independent Factor	Level	Shap.-Wilk p	Independent t-test			Factorial ANOVA ^{a,b,c}				
			Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	η^2
Novelty	Derivative	.116	3.967	.913	.692	4.021	.157	.533	.468	.008
	Platform	.519	4.042	.789		3.964	.164			
Technology	Medium	.809	3.891	.795	.224	3.888	.154	1.356	.248	.020
	High	.272	4.118	.889		4.108	.170			
Pace	Fast	.384	4.067	.909	.467	4.026	.149	.211	.647	.003
	Blitz	.567	3.930	.768		3.960	.169			
Complexity	Assembly	.609	4.007	.710	.995	4.056	.188	.619	.434	.009
	System	.415	4.005	.902		3.933	.136			

a. R Squared = .100 (Adjusted R Squared = -.086)
b. Sum of Squares: Type III
c. Levene's Test p = 0.134

Overall, the technology factor has a potential effect on project manager's autonomy. Obviously, other factors like project manager's experience, organisational structure may have stronger influence on project manager's autonomy and should be considered to better explain its variability. It seems that novelty, pace and complexity of a project does not influence how project managers perceive their work discretion. The following presentation of the results is less technical and readers of the thesis paper are referred to Appendix III for the remaining result tables of the main effects.

6.2 Results for Project Governance

Project governance was measured by five items which are analyzed separately. Analysis of the main factors resulted in seven significant and potentially significant effects that shape project governance (see Table 6.1). Interestingly, it does not follow the hypothesized entrepreneurial direction with the only exception of the technology factor.

Firstly, the higher the technological complexity of the project the more likely it is that project governance will provide valuable insights and advice. However, the higher-tech project governance tends to follow more rigid rules and elaborate procedures when making project decisions. The same exact behaviour can be observed for project scope complexity factor. When project scope complexity grows, senior managers can provide more valuable insights, probably, at the expense of more rigidly designed decision

making rules and procedures. In addition, governance provides significantly less valuable insights and advice when higher novelty projects are carried out.

Pace has two potentially significant effects on how projects are governed. First of all, when the pace of a project grows, project governance is less able to remove obstacles and roadblocks. Secondly, the higher the pace the more elaborate procedures are imposed to be followed by project teams. In addition, pace is the sole factor that has any potential effect on these two dependent factor groups. What is more, complexity is also the single factor having an effect on how project achievements can be reported to project governing bodies. When the complexity of a project scope grows, teams have more freedom to choose the reporting procedure.

6.3 Results for Project Management Structure

Project management structure was measured by thirteen items, which are analyzed under the single factor of 'project management structure'. Overall, only project technology factor has a potentially significant effect (see Table 6.1), whereas other factors do not have an effect on project management structure.

The growing technological complexity of a project pushes organisations to embrace a more entrepreneurial approach to project management when compared to less technologically advanced projects. It is important to observe that the factor explains only 2.6% and the full model only 8.6% of variability in how project management is structured. This suggests to include other factors, possibly, organisational structure, individual cognitions of a project manager and teams among others to better explain this variability. In addition, the direct relation between project governance and project management structure could be analyzed. The EPM concept suggests only an indirect relationship between environmental conditions and project management structure mediated by project governance (see Figure 3.4).

6.4 Results for Project Resource Orientation

Project resource orientation was measured by three items, which are analyzed separately. The analyses resulted in five significant and potentially significant effects (see Table 6.1).

Firstly, the growing pace of a project makes it more challenging to revise project budget. Secondly, the adherence to project schedule by controlling project resources is stronger when project novelty and pace is higher. Finally, project resources tend to be borrowed, rented or be outsourced when pace and complexity of a project grows.

6.5 Results for Project Success Measures

Project success was measured by four items, which are analyzed separately. The analyses provided only one significant effect (see Table 6.1). The growing project scope complexity pushes organizations to measure project success against business value added to the project delivering organization. It explains almost 10% of variability,

which is a relatively large effect size. Overall, all of the factors have a weak effect on how project success is measured.

This concludes the presentation of research results. In the final chapter of this dissertation these results are discussed in the light of the hypothesis made in Chapter 4. Also, the general conclusion of the dissertation is made and possibilities for future research are proposed.

7 Discussion and Conclusions

7.1 Discussing Hypotheses

In Chapter 4 it was hypothesized that proclivity towards EPM as defined in this thesis is stronger when project novelty, technology and pace are higher and when scope complexity is lower. The following discussion is carried out for each of these hypotheses separately.

7.1.1 Novelty Effect

The novelty factor has one significant and two partly significant effects out of fourteen different test scenarios. For projects that have less market innovative outcomes project governance is significantly more likely to provide valuable insight and advice. It is opposite to the hypothesized entrepreneurial direction. This result can probably be explained by assuming that project governance accumulates knowledge over time and uses it when improving subsequent products. This knowledge is not available when products are new to market and project teams are given responsibility to research markets and gain insights on their own, as was also observed by Shenhar and Dvir (2004).

Project resource orientation is partly impacted by the project's novelty factor. Projects that deliver novel outcomes are more rigidly adhering to projected schedules by adjusting required resources when compared to less innovative projects. This result is in line with the hypothesis. It is obviously important to push new products to market as planned in order to gain highest profits, even if it requires additional resources. Furthermore, as predicted by the hypothesis, innovative project outcomes are more likely to be delivered by using outsourced, rented or borrowed resources. It is probably safe to assume that innovative projects are larger in scope and require more resources, which are more likely to be borrowed, rented or outsourced when compared to improvement projects. What is more, the growing project scope complexity also has a partly significant effect on project resource orientation, the fact, which supports the assumption.

Overall, the novelty factor has a weak effect towards EPM in the collected research sample. Eleven out of fourteen tests had no significant effect. One effect was significant, but did not follow, whereas two partly significant effects followed the hypothesis.

7.1.2 Technology Effect

The technology factor has one significant and one potentially significant effect. Firstly, in contrast to the novelty effect, growing technological complexity engages project governance to provide significantly more valuable insights and advices in order to steer projects. This result follows the hypothesized direction of a stronger entrepreneurial approach to managing projects as it is defined in this thesis. It could

probably be held a truly entrepreneurial way if project decisions were left to be made by project teams that are properly utilizing those insights and advices, as it is meant to be by the author of this thesis. It is important to observe that technology factor has the strongest effect (though not significant) out of the four independent factors on project management structure, which follows the hypothesized direction. One of the attributes of theorized entrepreneurial project management structure is significant decision making power delegated to project members and teams, increasing the probability of entrepreneurial relations between project governance and team. Overall, in the current author's opinion, the project management structure factor, as it is designed in this research, is most important when analysing EPM. The technology factor has a potential to be a significant factor in determining how project management can be structured in an organization. In addition, there are more elements, project governance for instance, where technology can have a significant effect.

Secondly, in this research sample, though not significantly, technology factor has an effect on project governance that follows the trade-off function. Senior management is capable to provide insights and advices to technologically challenging projects, but probably at the expense of adding established checklist type procedures to be followed by project teams. What is more, senior management makes major project decisions by following better established rules and procedures when compared to less technically sophisticated projects. The proper balance point of this trade-off could possibly be found by further research with project success measures included.

Also, the technology factor follows, though not significantly, the hypothesized pattern when it comes to project success measures. Success measured as a value added to business, end-user and community or infrastructure is less important to medium-tech projects as compared to high tech-projects. On the other hand, project resource orientation is immune to any significant effect by technology factor. In addition, technology factor had the strongest and in line with the hypothesis effect on project manager's autonomy. Overall, it can be the determining factor when applying entrepreneurial project management approach.

7.1.3 Pace Effect

Project pace has a significant effect on project resource orientation. The higher pace projects adhere stronger to schedules by adjusting required resources as compared to slower pace projects, which are more likely to adjust schedules to the resources at hand. It follows the hypothesized entrepreneurial direction. In addition, project pace can have three potentially significant effects if a larger research sample could be accumulated.

First of all, it could be potentially more difficult to review project budgets as the pace increases. As Shenhar and Dvir (2004) observed, blitz projects can occur in the times of crisis. Secondly, a growing project pace can reduce the ability of senior management to remove obstacles and roadblocks, though Shenhar and Dvir (2004) emphasize senior management's involvement in supporting and monitoring this type of

projects. These results do not follow the hypothesis. Possibly, the criticality of time reduces the value of time consuming analysis and involvement by project governance, but instead, it prepares teams for blitz projects by imposing more rigid rules and procedures to be followed. It could be that these rules and procedures are sole mechanisms for removing obstacles and roadblocks for certain projects (i.e., rescue operations).

Shenhar and Dvir (2004) emphasize high levels of autonomy that blitz project managers have, but in this research autonomy was not significantly different between two pace levels. Also, the pace variable had no significant effect on how project management is structured nor how project success is measured. Overall, the pace factor has a weak effect on EPM. One of its effects follows significantly the hypothesized entrepreneurial direction, whereas three potentially significant effects follow the opposite direction. Therefore, the hypothesis of the pace effect can neither be rejected nor accepted, but rather needs further research and tuning. It is possible, that pace factor affects the emergence of EPM approach in both directions.

7.1.4 Complexity Effect

The complexity factor has two significant effects. Firstly, it effects how project governance makes decisions. It follows less rigid rules and procedures when making decisions for higher complexity projects. Secondly, project success as a value added to business is a significantly stronger measure for higher complexity projects. These results contradict the hypothesized values. In addition, opposite to the hypothesized direction are other partly significant effects.

For system complexity projects governance provides more valuable insights and advices than it does to assembly type projects. Also, project managers and teams have more freedom to choose procedures for reporting project achievements to project governing bodies. And as it was observed previously, larger scope complexity tends to be dealt with by using more rented, borrowed or outsourced resources.

The hypothesized effect of complexity was based on the premise that ‘smallness’ encourages more entrepreneurial activities. The smallness in this sense is a human interaction factor, like having small teams. Obviously, it does not apply to the smallness of scope complexity. It is a gratifying fact that this hypothesis can be rejected and be actually reversed: the evidence of EPM is stronger when scope complexity is higher. The sense of smallness can be achieved by having small and dedicated teams with well established multiple communication channels and delivering results that contribute to the achievement of large scope project or program outcomes. In addition, project scope complexity had no significant effect on project management structure and project manager’s autonomy. This fact imposes that smallness or proclivity towards EPM can be achieved regardless of the scope complexity and in some instances can even be stronger for larger scope projects.

7.2 Conclusions and Future Research

The author of this dissertation endeavoured to apply the knowledge of entrepreneurship to the project management discipline in a way that would embrace innovation, autonomy, proactiveness, risk-taking and other characteristics associated with entrepreneurship. As a result, the concept of EPM was developed. It consolidates the theory and research of entrepreneurship and project management for delivering innovative and complex projects and provides a contrast to the prevailing bureaucratic project management procedures. The proposed concept of EPM has several important implications.

Firstly, it has been shown by the conducted research that the concept only moderately resembles the hypothesized nature of how projects are managed in the collected research sample. The beauty of developing concept lies in the fact that, unlike building a theory, it may not necessarily represent the nature of reality, but it rather proposes the new order of things. The elements of EPM concept are certainly not new, but they were assembled together in a way that constitutes a new approach to researching, analysing and possibly configuring how projects are managed.

Secondly, the concept of EPM is still in its infancy stage and there is a huge potential for its further development. For example, antecedents of EPM besides already modelled project type and individual cognitions could also include other aspects, i.e. organizational culture and structure, which may also have an effect on how projects are managed. In addition, a further effort must be made to develop a proper research tool, which in the case of this research had a relatively high level of abstraction of certain elements, which may have been misunderstood by research participants. It must be further developed and tested in order to gain the status of a legitimate research tool.

Thirdly, the concept has to be further researched by measuring project success in order to prove its suggested advantages over bureaucratic project management approaches in complex environmental conditions. Success measures could also be used to fine-tune the concept. In addition, the theoretical outcomes of EPM must also be empirically researched to be confirmed or reconsidered. What is more, higher level interactions and interrelations of elements could also be researched to better understand the combined effects.

Fourthly, due to the entrepreneurial origin of this thesis, the concept, titles and certain subtitles of the constituent elements are named in a rather pro-entrepreneurship style. This should not imply that the concept is only applicable to analyze entrepreneurial projects *per se*, but could also be renamed and re-titled to emphasize a general applicability to analyze projects and their characteristics on a scale representing different approaches. This way, the concept could be used as a new benchmarking tool with which organisational project management could be improved and configured by applying characteristics most appropriate to the given project environment and resources at hand.

Lastly, the EPM concept does not prescribe any rules or procedures for managing projects, but rather shares characteristics that should be pursued in the given conditions. The author of this thesis believes that this way the concept enables a huge range of possible solutions to achieve the same characteristics for managing projects in a specific organizational environment. In theory, it should help organizations develop proprietary project management methods and improve dynamic capabilities and competitive advantage. In addition, it would contribute to the further development of project management discipline itself.

References

- Ahmad, N. and Saymour, R.G. (2008), 'Defining entrepreneurial activity: Definitions supporting frameworks for data collection', *OECD Statistics Working Papers*, 1. [Online] DOI: 10.1787/243164686763 (Accessed: 13 May 2012).
- Aiken, M. and Hage, J. (1971) 'The organic organization and innovation', *Sociology*, 5 (1), pp. 63-82. [Online] DOI: 10.1177/003803857100500105 (Accessed: 13 May 2012).
- Arend, R.J. and Chen, Y. (2011) 'Entrepreneurship as dynamic, complex, disequilibrium: A focus that benefits strategic organization', *Strategic Organization*, 10 (1), pp. 85-95. [Online] DOI: 10.1177/1476127011431340 (Accessed: 6 February 2012).
- Archer, T.M. (2003) 'Web-based surveys', *Journal of Extension*, 41 (4), *Tools of the Trade* [Online]. Available at: <http://www.joe.org/joe/2003august/tt6.php> (Accessed: 2 July 2012).
- Ashmos, D.P., Duchon, D. and McDaniel, R.R., Jr (2000) 'Organizational responses to complexity: the effect on organizational performance', *Journal of Organizational Change Management*, 13 (6), pp. 577-594, *ProQuest* [Online]. Available at: <http://www.proquest.co.uk/> (Accessed: 1 June 2012).
- Baron, R.A. (1998) 'Cognitive mechanisms in entrepreneurship: Why and when entrepreneurs think differently than other people', *Journal of Business Venturing*, 13 (4), pp. 275-294. [Online] DOI: 10.1016/S0883-9026(97)00031-1 (Accessed: 13 May 2012).
- Bettis, R.A. and Hitt, M.A. (1995) 'The new competitive landscape', *Strategic Management Journal*, 16, pp. 7-19, *JSTOR* [Online]. Available at: <http://www.jstor.org/> (Accessed: 12 May 2012).
- Brown, S.L. and Eisenhardt, K.M., (1998) *Competing on the edge: Strategy as structured chaos*. Boston: Harvard Business School Press
- Brown, R.E., Davidsson, P. and Wiklund, J. (2001) 'An operationalization of Stevenson's conceptualization of entrepreneurship as opportunity-based firm behavior', *Strategic Management Journal*, 22 (10), pp. 953-968. [Online] DOI: 10.1002/smj.190 (Accessed: 14 May 2012).
- Carifio, J. and Perla, R. (2008) 'Resolving the 50-year debate around using and misusing Likert scales', *Medical Education*, 42, pp. 1152-1154. [Online] DOI: 10.1111/j.1365-2923.2008.03173.x (Accessed: 3 August 2012).
- Cohen, D.J. and Graham, R.J. (2000) *The project manager's MBA: how to translate project decisions into business success*. San Francisco: Jossey-Bass.
- Cummings, J. and Pletcher, C. (2011) 'Why project networks beat project teams', *MIT Sloan Management Review*, 52 (3), pp. 75-82, *ProQuest* [Online]. Available at: <http://www.proquest.co.uk/> (Accessed: 17 May 2012).
- De Meyer, A., Loch, C.H. and Pich, M.T. (2002) 'Managing project uncertainty: from variation to chaos', *MIT Sloan Management Review*, 43 (2), pp. 60-67, *EBSCO* [Online]. Available at: <http://www.ebscohost.com/> (Accessed: 20 May 2012).
- Dvir, D., Sadeh, A., Malach-Pines, A. (2006) 'Projects and project managers: the relationship between project managers' personality, project types, and project success',

- Project Management Journal*, 37 (5), pp. 36-48, EBSCO [Online]. Available at: <http://www.ebscohost.com/> (Accessed: 2 July 2012).
- Eisenhardt, K.M., Brown, S.L. and Neck, H.M. (2000) 'Competing on the entrepreneurial edge', in Meyer, G.D and Heppard, K.A (ed.) *Entrepreneurship as strategy: Competing on the entrepreneurial edge*. Thousand Oaks: Sage Publications, Inc., pp. 49-62.
- Eisenhardt, K.M. and Tabrizi, B.N. (1995) 'Accelerating adaptive processes: product innovation in the global computer industry', *Administrative Science Quarterly*, 40 (1), pp. 84-110, ProQuest [Online]. Available at: <http://www.proquest.co.uk/> (Accessed: 1 June 2012).
- Ekvall, G. (1996) 'Organizational climate for creativity and innovation', *European Journal of Work and Organizational Psychology*, 5 (1), pp. 105-123. [Online] DOI: 10.1080/13594329608414845 (Accessed: 17 May 2012).
- Field, A. (2005) *Discovering statistics using SPSS*. 2nd edn. London: SAGE Publications
- Foss, N.J. and Klein, P.G. (2012) *Organizing entrepreneurial judgement: A new approach to the firm*. New York: Cambridge University Press
- Gartner, W.B. (1989) 'Some suggestions for research on entrepreneurial traits and characteristics', *Entrepreneurship Theory and Practice*, 14 (1), pp. 27-37, EBSCO [Online]. Available at: <http://www.ebscohost.com/> (Accessed: 13 May 2012).
- Geraldi, J.G. (2009) 'Reconciling order and chaos in multi-project firms', *International Journal of Managing Projects in Business*, 2 (1), pp. 149-158, ProQuest [Online]. Available at: <http://www.proquest.co.uk/> (Accessed: 12 May 2012).
- Gibb, A. (2000) 'Corporate restructuring and entrepreneurship: what can large organizations learn from small?'. *Enterprise and Innovation Management Studies*, 1 (1), pp. 19-35, EBSCO [Online]. Available at: <http://www.ebscohost.com/> (Accessed: 20 May 2012).
- Guth, W.D. and Ginsberg, A. (1990) 'Guest editors' introduction: Corporate entrepreneurship', *Strategic Management Journal*, 11 (5), pp. 5-15. [Online]. DOI: 10.1016/j.ymeth.2009.12.016 (Accessed: 14 May 2012).
- Hebert, R.F. and Link, A.N. (1989) 'In search of the meaning of entrepreneurship', *Small Business Economics*, 1 (1), pp. 39-49. [Online] DOI: 10.1007/BF00389915 (Accessed: 13 May 2012).
- Hodgson, D. (2002) 'Disciplining the professional: The case of project management', *Journal of Management Studies*, 39 (6), pp. 803-821. [Online] DOI: 10.1111/1467-6486.00312 (Accessed: 12 May 2012).
- Hodgson, D. (2004) 'Project work: The legacy of bureaucratic control in the post-bureaucratic organization', *Organisation*, 11 (1), pp. 81-100, ProQuest [Online]. Available at: <http://www.proquest.co.uk/> (Accessed: 12 May 2012).
- Hoegl, M. and Parboteeah, K.P. (2006) 'Autonomy and teamwork in innovative projects', *Human Resource Management*, 45 (1), pp. 67-79. [Online] DOI: 10.1002/hrm.20092 (Accessed: 20 May 2012).

- Ireland, R.D., Covin, J.G. and Kuratko, D.F. (2009) 'Conceptualizing corporate entrepreneurship strategy', *Entrepreneurship Theory and Practice*, 33 (1), pp. 19-46. [Online] DOI: 10.1111/j.1540-6520.2008.00279.x (Accessed: 13 May 2012).
- Ireland, R.D., Kuratko, D.F. and Morris, M.H. (2006) 'A health audit for corporate entrepreneurship: innovation at all levels: part II', *Journal of Business Strategy*, 27 (2), pp. 21-30. [Online] DOI: 10.1108/02756660610650019 (Accessed: 1 May 2012).
- Jaafari, A. (2001) 'Management of risks, uncertainties and opportunities on projects: time for a fundamental shift', *International Journal of Project Management*, 19 (2), pp. 89-101. [Online] DOI: 10.1016/S0263-7863(99)00047-2 (Accessed: 20 May 2012).
- Jaafari, A. (2003) 'Project management in the age of complexity and change', *Project Management Journal*, 34 (4), pp. 47-57, EBSCO [Online]. Available at: <http://www.ebscohost.com/> (Accessed: 1 June 2012).
- Kanter, R.M. (1986) 'The new workforce meets the changing workplace: Strains, dilemmas, and contradictions in attempts to implement participative and entrepreneurial management', *Human Resource Management*, 25 (4), pp. 515-537 ProQuest [Online]. Available at: <http://www.proquest.co.uk/> (Accessed: 12 May 2012).
- Kirzner, I.M. (2009) 'The alert and creative entrepreneur: A clarification', *Small Business Economics*, 32 (2), pp. 145-152. [Online] DOI: 10.1007/s11187-008-9153-7 (Accessed: 13 May 2012).
- Kwak, Y.H. and Laplace, K.S. (2005) 'Examining risk tolerance in project-driven organization', *Technovation*, 25, pp. 691-695. [Online] DOI: 10.1016/j.technovation.2003.09.003 (Accessed: 14 February 2012).
- Lewis, M.W., Welsh, M.A., Dehler, G.E. and Green, S.G. (2002) 'Product development tensions: exploring contrasting styles of project management', *Academy of Management Journal*, 45 (3), pp. 546-564, JSTOR [Online]. Available at: <http://www.jstor.org/> (Accessed: 8 February 2012).
- Lindkvist, L., Soderlund, J. and Tell, F. (1998) 'Managing product development projects: On the significance of fountains and deadlines', *Organization Studies*, 19 (6), pp. 931-951. [Online] DOI: 10.1177/017084069801900602 (Accessed: 18 May 2012).
- Lumpkin, G.T. and Dess, G.G. (1996) 'Clarifying the entrepreneurial orientation construct and linking it to performance', *Academy of Management Review*, 21 (1), pp. 135-172, ProQuest [Online]. Available at: <http://www.proquest.co.uk/> (Accessed: 14 May 2012).
- Lumpkin, G.T., Cogliser, C.C. and Schneider, D.R. (2009) 'Understanding and measuring autonomy: An entrepreneurial orientation perspective', *Entrepreneurship Theory and Practice*, 33 (1), pp. 47-69. [Online] DOI: 10.1111/j.1540-6520.2008.00280.x (Accessed: 14 May 2012).
- Maylor, H. (2010) *Project Management*. 4th edn. Harlow: Pearson Education Ltd.
- Malach-Pines, A., Sadeh, A., Dvir, D. and Yafe-Yanai, O. (2002) 'Entrepreneurs and managers: Similar yet different', *The International Journal of Organizational Analysis*, 10 (2), pp. 172-190, ProQuest [Online]. Available at: <http://www.proquest.co.uk/> (Accessed: 13 May 2012).

- Miller, D. (1983) 'The correlates of entrepreneurship in three types of firms', *Management Science*, 29 (7), pp. 770-791, *ProQuest* [Online]. Available at: <http://www.proquest.co.uk/> (Accessed: 14 May 2012).
- Packendorff, J. (1995) 'Inquiring into the temporary organization: New direction for project management research', *Scandinavian Journal of Management*, 11 (4), pp. 319-333, *ScienceDirect* [Online]. Available at: <http://www.sciencedirect.com/> (Accessed: 17 May 2012).
- Palich, L.E. and Bagby, D.R. (1995) 'Using cognitive theory to explain entrepreneurial risk-taking: Challenging conventional wisdom', *Journal of Business Venturing*, 10 (6), pp. 425-438. [Online] DOI: 10.1016/0883-9026(95)00082-J (Accessed: 14 May 2012).
- Parker, S.K., Turner, N. and Williams, H.M. (2006) 'Modeling the antecedents of proactive behavior at work', *Journal of Applied Psychology*, 91 (3), pp. 636-652. [Online] DOI: 10.1037/0021-9010.91.3.636 (Accessed: 1 June 2012).
- Pich, M.T., Loch, C.H. and De Meyer, A. (2002) 'On uncertainty, ambiguity, and complexity in project management', *Management Science*, 48 (8), pp. 1008-1023, *JSTOR* [Online]. Available at: <http://www.jstor.org/> (Accessed: 2 February 2012).
- Pinchot, G. (1985) *Intrapreneuring: Why you don't have to leave the corporation to become an entrepreneur*. New York: Harper & Row.
- Project Management Body of Knowledge* (2008) 4th edn. Newtown Square: Project Management Institute, Inc.
- Razali, N.M. and Wah, Y.B. (2011) 'Power comparison of Shapiro-Wilk, Kolmogorow-Smirnov, Lilliefors and Anderson-Darling tests', *Journal of Statistical Modeling and Analytics*, 2 (1), pp. 21-33, [Online]. Available at: <http://instatmy.org.my/downloads/e-jurnal%202/3.pdf> (Accessed: 3 August 2012).
- Sharma, P. and Chrisman, J.J. (1999) 'Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship', *Entrepreneurship Theory and Practice*, 23 (3), pp. 11-27, *EBSCO* [Online]. Available at: <http://www.ebscohost.com/> (Accessed: 14 May 2012).
- Shenhar, A.J. and Dvir, D. (1996) 'Toward a typological theory of project management', *Research Policy*, 25 (4), pp. 607-632. [Online] DOI: 10.1016/0048-7333(95)00877-2 (Accessed: 19 May 2012).
- Shenhar, A.J. and Dvir, D. (2004) 'How projects differ, and what to do about it', in Pinto, J.K. and Morris, P.W.G., *The Wiley guide to managing projects*. New Jersey: John Wiley & Sons, Inc.
- Stevenson, H.H. and Jarillo, J.C. (1990) 'A paradigm of entrepreneurship: Entrepreneurial management', *Strategic Management Journal*, 11, pp. 17-27, *JSTOR* [Online]. Available at: <http://www.jstor.org/> (Accessed: 6 January 2012).
- Stevenson, H.H. (1999) 'A perspective on entrepreneurship', in Sahlman, W.A. et al. *The entrepreneurial venture: readings selected*. 2nd edn. Boston: Harvard Business School Press.
- Stewart, A. (1991) 'A prospectus on the anthropology of entrepreneurship', *Entrepreneurship Theory and Practice*, 16 (2), pp. 71-91, *EBSCO* [Online]. Available at: <http://www.ebscohost.com/> (Accessed: 13 May 2012).

- Strauss, K., Griffin, M.A. and Rafferty, A.E. (2009) 'Proactivity directed toward the team and organization: the role of leadership, commitment and role-breadth self-efficacy', *British Journal of Management*, 20 (3), pp. 279-291. [Online] DOI: 10.1111/j.1467-8551.2008.00590.x (Accessed: 1 June 2012).
- Teece, D.J. (2007) 'Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance', *Strategic Management Journal*, 28, pp. 1319-1350. [Online] DOI: 10.1002/smj.640 (Accessed: 15 January 2012).
- Turner, J.R. and Cochrane, R.A. (1993) 'Goals-and-methods matrix: Coping with projects with ill defined goals and/or methods of achieving them', *International Journal of Project Management*, 11 (2), pp. 93-102. [Online] DOI: 10.1016/0263-7863(93)90017-H (Accessed: 19 May 2012).
- Wallin, J., Larsson, A., Isaksson, O. and Larsson, T. (2011) 'Measuring innovation capability – assessing collaborative performance in product-service system innovation', *3rd CIRP international conference on industrial product service systems*. Braunschweig, no date. Available at: http://pure.ltu.se/portal/files/33033016/WallinLarssonIsaksson_MeasuringInnovationCapabilityInProductServiceSystemFocusedDevelopment_2011.pdf (Accessed: 20 May 2012).
- Webb, J. (2000) 'Questionnaires and their design', *The Marketing Review*, 1 (2), pp. 197-218, EBSCO [Online]. Available at: <http://www.ebscohost.com/> (Accessed: 2 July 2012).
- Williams, T. (2005) 'Assessing and moving on from the dominant project management discourse in the light of project overruns', *IEEE Transactions on Engineering Management*, 52 (4). [Online] DOI: 10.1109/TEM.2005.856572 (Accessed: 19 May 2012).
- Williams, H.M., Parker, S.K. and Turner, N. (2010) 'Proactively performing teams: the role of work design, transformational leadership, and team composition', *Journal of Occupational and Organizational Psychology*, 83 (2), pp. 301-324. [Online] DOI: 10.1348/096317910X502494 (Accessed: 1 June 2012).

Appendixes

Appendix I

Table I.1 Comparison of creative-reflective and rational process-driven project management professionals (Lester 1994; in Jaafari, 2003)

POINT	Normative (process-driven) model	Creative-reflective model
Character	Technical, logical; problem solving	Creative, interpretative; design
Capability	Solvable, convergent problems	Congruent futures; 'messes', problematic situations, divergent problems
Approach	Solving problems; applying knowledge competently and rationally	Understanding problematic situations and resolving conflicts of value; framing and creating desired outcomes
Criteria	Logic, efficiency, planned outcomes; cause-effect, proof	Values, ethics, congruence of both methods and outcomes; systemic interrelationships, theory, faith
Epistemology	Objectivism: knowledge is stable and general; precedes and guides action	Constructivism: knowledge is transient, situational, personal and unique; both informs action and is generated by it
Validation	By reference to other's expectations: standards, accepted wisdom	By questioning fitness for purpose, fitness of purpose and systemic discourse; 'truth' validity; 'value'
Thinking	Primarily deductive/analytical; sceptical of intuition	Inductive, deductive and abductive; uses 'intelligent intuition'
Profession	A bounded, externally-defined role, characterized by norms, values and a knowledge-base common to the profession	A portfolio of learningful activity individual to the practitioner, integrated by personal identity, perspectives, values and capabilities
Professionalism	Objectivity, rules, codes of practice	Exploration of own and others' values, personal ethics, mutual inquiry, shared expectations
Professional standards	Defined by the employer, professional body or other external agency according to its norms	Negotiated by the participants and situation in accordance with their and values other stakeholders in the practice values, beliefs and desired outcomes
Professional	Initial development concerned with acquiring development knowledge, developing competence and enculturation into the profession's value system; continuing development concerned with maintaining competence and updating knowledge	Ongoing learning and practice through reflective practice, critical enquiry and creative synthesis and action; continual questioning and refinement of personal knowledge, understanding, practice, values and beliefs

Appendix II

Online questionnaire available at:

(R) – denotes reversed items.

Entrepreneurial Orientation of Project Management

Hello and welcome to the survey studying entrepreneurial orientation of project management along various project types. This survey is part of the Master's thesis research in project management. It was tested to take less than 15 minutes to complete. All your responses will be kept strictly confidential.

The survey consists of 16 questions. Questions 1 to 7 are general questions regarding your organisation and basic project characteristics. Your answers to questions 8 to 11 will be used to identify the type of projects you typically manage. Questions 12 to 16 are a collection of statements to determine entrepreneurial orientation towards project management in your organisation. There is no right or wrong answer to these statements, it is only your opinion that truly matters.

Thank you for your participation!

This poll results are private

1. What is the principal industry of your organisation?

2. How old is your organisation?

- Up to 5 years
- 6 to 20 years
- 21 to 50 years
- Older than 51 years

3. How many employees does your organisation have?

- <20
- 20-50
- 50-250
- >250

4. How many years of project management experience do you have?

- <1 year
- 1-3 years
- 4-7 years

- >7 years
- I am not in project management

5. What is the average budget of projects you manage?

- Less than 100 000 EU (~130 000 \$)
- 100 000 - 500 000 EU (~130 000 - 635 000 \$)
- 500 000 - 1 500 000 EU (635 000 - 1 905 000 \$)
- More than 1 500 000 EU (1 905 000 \$)

6. What is the average duration of projects you manage?

- 1 to 3 months
- 3 to 9 months
- 9 to 18 months
- more than 18 months

7. How many members are included in the core team of your average project?

- 1-5 persons
- 6-10 persons
- 11-20 persons
- More than 20 persons

8. Which statement best describes the typical outcome of your managed project? 🇨🇦

- An extension or improvement of an existing product or service
- A new generation in an existing product or service family
- A new-to-the-world product or service
- Partnership building or sales related project
- None of the above

9. Which statement best describes the typical project you manage? 🇨🇦

- There is no new technology involved
- There is some new technology involved

- New, but existing technology is involved
- Key technologies for the project do not exist at its initiation
- None of the above

10. Which statement applies best to the typical project you manage? 🌟

- Time is not critical to organisational success
- Time-to-market is a competitive advantage and has an impact on business success
- Time is critical for project success. Delays mean project failure

11. Which statement best describes the scope complexity of your typical project? 🌟

- Project involves a collection of elements, components, and modules combined into a single unit that is performing a single function; less than 150 activities in the network (e.g., a coffee machine, subsystem of a system, restructuring functional unit)
- Project involves a complex collection of interactive elements and subsystems, jointly dedicated to a wide range of functions; up to few thousand activities in the network (e.g., a computer, a large software system, a business unit reorganization)
- Project involves a widespread collection of systems functioning together to achieve a common mission; up to ten thousand activities in the network (e.g., a city's highway system, a national communication network, restructuring of a global corporation)

12. Project Manager's Autonomy 🌟

I feel that I am my own boss and do not have to double check all of my decisions with someone else
This organization provides the chance to be creative and try my own project management methods and processes
This organization provides freedom to use my own judgment
There are many written rules and procedures that define project management process to be followed (R)
It is basically my own responsibility to decide how my project is managed
I almost always get to decide what I do on my job
New project management processes are implemented without going through elaborate justification and approval procedures

13. Project Governance 🌟

Upper management makes major project decisions by following rigid rules and elaborate procedures (R)
--

Senior managers support my project by removing obstacles and roadblocks
Project governance often provides valuable insight and advice to steer my project
Project governance imposes rigid and well established checklist type procedures to follow (R)
Project manager and team decide how to present project performance and achievements to governing bodies

14. Project Management Structure

We prefer loose, informal project control. There is a dependence on informal relations (MS)
We strongly emphasize getting things done even if this means disregarding formal project procedures (MS)
We strongly emphasize adapting freely to changing circumstances without much concern for past project practices (MS)
Manager's operating style is allowed to range freely from very formal to very informal (MS)
Project roles tend to be broadly defined with considerable freedom on how tasks are performed (proactiveness, autonomy)
We tend to take calculated risks in order to keep projects on track (risk-taking)
Project decisions are made fast, without over detailed investigation and analysis (innovativeness)
Project team members have considerable decision making power (autonomy)
Constructive discussions and debates are usual during project meetings (innovativeness)
We often share a joke and laugh during project meetings (innovativeness)
Project team relations are based on high trust and respect (innovativeness)
Changes in the project are expected and made without much bureaucracy (innovativeness)
Project team continuously engages in communication on project matters that cross team boundaries (innovativeness)

15. Project Resource Orientation

Once project budget is finalized and accepted, it is difficult to revise (R)
Project schedule controls the need for project resources (as opposed to project resources under control determine project schedule)
Project resources are totally controlled and owned by the organization (as opposed to being rented or borrowed) (R)

16. Project Success Measures Orientation

Our project success is mainly measured against predetermined scope, time and budget constraints (R)

Business value added to the developing organisation is the success measure of our projects

Our project success is mainly measured by the benefit added to the end-user

Benefit added to the community and/or national infrastructure is what we consider our main project success measure

Appendix III

Table III.1 Main effects of independent factors on project governance (I)

Dependent Variable: [EPG] Upper mgmt. makes pj. decisions by following simple rules and procedures										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.003	3.526	1.428	.951	3.514	.299	.025	.875	.000
	Platform	.000	3.513	1.805		3.419	.316			
Technology	Medium	.001	3.667	1.628	.350	3.717	.291	2.206	.143	.034
	High	.000	3.368	1.618		3.173	.330			
Pace	Fast	.002	3.610	1.579	.631	3.529	.286	.000	.988	.000
	Blitz	.002	3.417	1.680		3.406	.324			
Complexity	Assembly	.002	3.000	1.842	.067	2.962	.353	5.586	.021	.083
	System	.000	3.755	1.466		3.902	.269			

a. R Squared = .167 (Adjusted R Squared = -.021)
b. Sum of Squares: Type III
c. Levene's Test p = 0.200

Table III.2 Main effects of independent factors on project governance (II)

Dependent Variable:[EPG] Sr. mgrs. support my project by removing obstacles and roadblocks										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.001	3.846	1.226	.908	3.639	.282	.236	.629	.004
	Platform	.005	3.875	1.453		3.646	.263			
Technology	Medium	.006	3.842	1.220	.796	3.597	.276	.515	.475	.008
	High	.001	3.878	1.452		3.695	.265			
Pace	Fast	.001	4.023	1.354	.308	3.938	.244	2.658	.108	.040
	Blitz	.000	3.667	1.309		3.384	.291			
Complexity	Assembly	.015	3.792	1.318	.711	3.507	.325	.078	.781	.001
	System	.001	3.891	1.356		3.762	.222			

a. R Squared = .130 (Adjusted R Squared = -.061)
b. Sum of Squares: Type III
c. Levene's Test p = 0.058

Table III.3 Main effects of independent factors on project governance (III)

Dependent Variable:[EPG] Pj. gov. provides valuable insight and advice										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.002	4.412	1.158	.099	4.145	.250	4.972	.030	.079
	Platform	.015	3.897	1.334		3.785	.239			
Technology	Medium	.013	3.909	1.422	.264	3.676	.244	6.224	.015	.097
	High	.004	4.325	1.118		4.269	.243			
Pace	Fast	.006	4.071	1.351	.705	4.042	.226	1.901	.173	.032
	Blitz	.015	4.226	1.175		3.875	.257			
Complexity	Assembly	.092	3.727	1.638	.157	3.479	.293	2.255	.139	.037
	System	.001	4.314	1.049		4.368	.198			

a. R Squared = .290 (Adjusted R Squared = .119)
b. Sum of Squares: Type III
c. Levene's Test p = 0.246

Table III.4. Main effects of independent factors on project governance (IV)

Dependent Variable:[EPG] Pj. gov. imposes simple procedures to follow										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.009	3.135	1.398	.300	3.131	.285	.689	.410	.011
	Platform	.005	3.500	1.566		3.522	.292			
Technology	Medium	.002	3.500	1.502	.348	3.581	.268	1.284	.261	.020
	High	.017	3.154	1.479		3.063	.315			
Pace	Fast	.007	3.628	1.496	.050	3.837	.280	3.149	.081	.047
	Blitz	.005	2.972	1.424		2.904	.296			
Complexity	Assembly	.094	3.455	1.654	.670	3.355	.345	.025	.875	.000
	System	.001	3.281	1.436		3.326	.238			

a. R Squared = .150 (Adjusted R Squared = -.036)
b. Sum of Squares: Type III
c. Levene's Test p = 0.910

Table III.5 Main effects of independent factors on project governance (V)

Dependent Variable: [EPG] Pj. mgr. and team decide how to report pj. achievements										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.004	4.389	1.178	.352	4.166	.293	.985	.325	.016
	Platform	.002	4.024	1.475		3.851	.265			
Technology	Medium	.004	4.128	1.454	.774	3.939	.271	.284	.596	.005
	High	.002	4.263	1.245		4.066	.286			
Pace	Fast	.002	4.190	1.435	.919	4.092	.253	.242	.625	.004
	Blitz	.003	4.200	1.256		3.916	.295			
Complexity	Assembly	.075	3.682	1.524	.045	3.607	.340	2.991	.089	.046
	System	.000	4.400	1.226		4.341	.218			

a. R Squared = .148 (Adjusted R Squared = -.044)
b. Sum of Squares: Type III
c. Levene's Test p = 0.017

Table III.6 Main effects of independent factors on project management structure

Dependent Variable:[PMS] Project management structure										
			Independent t-test			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.120	4.151	.712	.929	4.155	.128	.267	.607	.004
	Platform	.442	4.165	.451		4.123	.134			
Technology	Medium	.089	4.069	.649	.242	4.033	.126	1.790	.185	.026
	High	.207	4.246	.718		4.258	.139			
Pace	Fast	.279	4.165	.702	.917	4.124	.122	.009	.926	.000
	Blitz	.515	4.149	.676		4.149	.138			
Complexity	Assembly	.254	4.125	.685	.771	4.146	.154	.054	.817	.001
	System	.361	4.173	.693		4.130	.111			

a. R Squared = .086 (Adjusted R Squared = -.102)
b. Sum of Squares: Type III
c. Levene's Test p = 0.260

Table III.7 Main effects of independent factors on project resource orientation (I)

Dependent Variable: [PRO] Once pj. budget is finalized, it is easy to review										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.020	3.000	1.354	.688	3.099	.263	.272	.604	.004
	Platform	.008	3.175	1.551		3.067	.276			
Technology	Medium	.006	3.128	1.454	.883	3.063	.251	.327	.570	.005
	High	.013	3.053	1.469		3.104	.295			
Pace	Fast	.008	3.272	1.500	.236	3.243	.243	2.018	.160	.032
	Blitz	.022	2.848	1.372		2.941	.290			
Complexity	Assembly	.098	3.208	1.474	.629	3.060	.312	.123	.727	.002
	System	.002	3.038	1.454		3.102	.235			

a. R Squared = .205 (Adjusted R Squared = .026)
b. Sum of Squares: Type III
c. Levene's Test p = 0.231

Table III.8 Main effects of independent factors on project resource orientation (II)

Dependent Variable: [PRO] Pj. schedule controls pj. resources										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.000	3.794	1.225	.071	3.835	.241	3.557	.064	.057
	Platform	.001	4.275	1.358		4.503	.264			
Technology	Medium	.011	3.974	1.345	.486	4.043	.224	.102	.750	.002
	High	.000	4.139	1.291		4.361	.289			
Pace	Fast	.002	3.750	1.410	.041	3.711	.265	4.320	.042	.068
	Blitz	.001	4.412	1.104		4.612	.246			
Complexity	Assembly	.015	3.905	1.375	.574	3.960	.310	1.391	.243	.023
	System	.000	4.113	1.296		4.394	.201			

a. R Squared = .271 (Adjusted R Squared = .098)
b. Sum of Squares: Type III
c. Levene's Test p = 0.412

Table III.9 Main effects of independent factors on project resource orientation (III)

Dependent Variable: [PRO] Pj. resources are rented, borrowed or outsourced										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.000	2.629	1.416	.024	2.714	.272	2.505	.119	.041
	Platform	.003	3.368	1.460		3.175	.287			
Technology	Medium	.000	3.000	1.434	.949	3.152	.264	1.588	.213	.027
	High	.004	3.028	1.540		2.740	.300			
Pace	Fast	.001	2.974	1.513	.725	2.648	.277	3.326	.073	.054
	Blitz	.002	3.059	1.455		3.233	.283			
Complexity	Assembly	.005	2.682	1.460	.183	2.707	.332	2.742	.103	.045
	System	.000	3.157	1.475		3.181	.233			

a. R Squared = .212 (Adjusted R Squared = .021)
b. Sum of Squares: Type III
c. Levene's Test p = 0.188

Table III.10 Main effects of independent factors on project success measures (I)

Dependent Variable: [PSM] Against budget, time and quality constraints										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.000	4.744	.910	.695	4.789	.178	.000	.997	.000
	Platform	.000	4.625	1.005		4.675	.186			
Technology	Medium	.000	4.725	.960	.672	4.796	.175	.680	.413	.011
	High	.000	4.641	.959		4.651	.193			
Pace	Fast	.000	4.698	.887	.997	4.719	.170	.213	.646	.003
	Blitz	.000	4.667	1.042		4.736	.192			
Complexity	Assembly	.000	4.840	.554	.546	4.852	.214	.143	.706	.002
	System	.000	4.611	1.089		4.620	.155			

a. R Squared = .099 (Adjusted R Squared = -.098)
b. Sum of Squares: Type III
c. Levene's Test p = **0.004**

Table III.11 Main effects of independent factors on project success measures (II)

Dependent Variable: [PSM] Against business value added										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.007	4.179	1.233	.911	4.082	.243	1.178	.282	.019
	Platform	.001	4.079	1.531		4.337	.273			
Technology	Medium	.006	4.026	1.345	.391	4.075	.251	.220	.641	.004
	High	.001	4.231	1.423		4.381	.273			
Pace	Fast	.000	4.142	1.507	.625	4.128	.237	.553	.460	.009
	Blitz	.005	4.114	1.231		4.296	.277			
Complexity	Assembly	.046	3.640	1.381	.030	3.733	.289	6.804	.011	.099
	System	.000	4.365	1.329		4.642	.236			

a. R Squared = .214 (Adjusted R Squared = .037)
b. Sum of Squares: Type III
c. Levene's Test p = 0.103

Table III.12 Main effects of independent factors on project success measures (III)

Dependent Variable: [PSM] Against benefit added to the end-user										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	$\eta\rho^2$
Novelty	Derivative	.007	4.025	1.250	.569	4.016	.253	2.097	.152	.031
	Platform	.001	3.750	1.548		3.601	.277			
Technology	Medium	.000	3.769	1.366	.391	3.640	.261	1.249	.268	.019
	High	.001	4.000	1.449		3.972	.274			
Pace	Fast	.004	3.818	1.498	.601	3.715	.245	.013	.909	.000
	Blitz	.000	3.972	1.298		3.864	.282			
Complexity	Assembly	.008	3.640	1.497	.388	3.602	.303	.430	.514	.007
	System	.000	4.000	1.361		3.963	.234			

a. R Squared = .159 (Adjusted R Squared = -.022)
b. Sum of Squares: Type III
c. Levene's Test p = 0.566

Table III.13 Main effects of independent factors on project success measures (IV)

Dependent Variable: [PSM] Against benefit added to the community										
			Mann-Whitney			Factorial ANOVA ^{a,b,c}				
Source	Level	Shap.-Wilk p	Mean	Std. Dev.	p (2-tailed)	Marginal Mean	Std. Err.	F	p	η^2
Novelty	Derivative	.005	3.057	1.413	.840	3.055	.291	.437	.511	.007
	Platform	.003	3.125	1.522		2.927	.327			
Technology	Medium	.001	2.872	1.436	.192	2.831	.272	1.025	.315	.017
	High	.006	3.333	1.474		3.165	.357			
Pace	Fast	.003	3.114	1.450	.862	3.015	.266	.210	.649	.003
	Blitz	.010	3.065	1.504		2.962	.343			
Complexity	Assembly	.015	2.727	1.609	.143	2.693	.373	.791	.377	.013
	System	.001	3.245	1.385		3.244	.255			

a. R Squared = .100 (Adjusted R Squared = -.110)
b. Sum of Squares: Type III
c. Levene's Test p = 0.163