

Giorgos Ksouris

Job Satisfaction and Innovation in Non-profit Organisations

Relationships between Facets of Job Satisfaction and Technological and Administrative Innovations

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<p>Research indicates that organisations need to be more flexible, adaptive, entrepreneurial and innovative in order to effectively meet the changing demands of today's environment. On the other hand, it seems that higher level of job satisfaction is beneficial for companies to promote innovation climate and innovation activities. Therefore, job satisfaction appears to be tied to innovation, which is vital for the long-term success of the non-profit organisations.</p> <p>This study examines the potential relationships between job satisfaction facets, such as income, opportunities for advancement, relations with co-workers and supervisor, nature of work and job security, with technological and administrative innovations in the context of non-profit organisations. There were three stages to the research: formulating a conceptual model defining, based on literature, the concepts and relationships of job satisfaction, its facets and the two types of innovation; studying a non-profit organisation and identifying a way of measuring the afore-mentioned relationships; and testing the conceptual model utilising statistical theories.</p> <p>The employees of the case-study organisation completed a questionnaire measuring job satisfaction facets, technological and administrative innovations. The results indicated that facets that are favourable to administrative innovation differ from those that are conducive to technological innovation. In particular, satisfaction with income and the relations with co-workers are statistically significant predictors of administrative innovation, in a positive and a negative way respectively. Plus, satisfaction with the opportunities for advancement is a positive significant predictor of technological innovation. Complementing these results, an automatic model, which was built using IBM SPSS Statistics 21, designated the relation with co-workers and the manager and the satisfaction with the income and the nature of work as further important predictors of technological innovation and the opportunities for advancement and the job security as additional important predictors of administrative innovation.</p>	
Keywords	job satisfaction facets, administrative innovation, technological innovation, non-profit organisations

Contents

Acronyms and Abbreviations	1
List of Figures	2
List of Tables	3
1 Introduction	4
1.1 Research Question	5
1.2 Research Approach	5
1.2.1 Case Study Research	6
1.2.2 Survey Research	8
1.3 Structure of the Report	8
2 Literature Review	10
2.1 Job Satisfaction	10
2.1.1 Defining Job Satisfaction	11
2.1.2 Global Job Satisfaction versus Facets of Satisfaction	12
2.1.3 Relative Importance of Facets	13
2.2 Innovation	15
2.2.1 Definitions of Innovation	16
2.2.2 Innovation Typologies	18
3 Job Satisfaction and Innovation Model	21
3.1 Factors Affecting Innovation	21
3.2 Relationship of Job Satisfaction with Innovation	23
3.2.1 Job Satisfaction, Motivation and Innovation	25
3.2.2 Individual Facets of Job Satisfaction and Innovation	26
3.3 Model Underlying the Study	26
3.3.1 Advancement	27
3.3.2 Co-workers	27
3.3.3 Supervision	27
3.3.4 Nature of work	28
3.3.5 Income	30
3.3.6 Security	31
3.4 Conceptual Model	31

4	The Case Organisation	33
4.1	Business Sector and Customers	34
4.2	Main Competitors	34
4.3	Present Market Position	35
4.4	SWOT Analysis	36
5	Measurement	39
5.1	Procedure	41
5.2	Participants	42
5.3	Measures	44
5.3.1	Technological Innovation	44
5.3.2	Administrative Innovation	45
5.3.3	Job Satisfaction Facets	46
5.4	Data Analysis	47
6	Results and Discussion	49
6.1	Descriptive Statistics	49
6.2	Reliability	52
6.2.1	Technological Innovation	53
6.2.2	Administrative Innovation	54
6.3	Validity	55
6.4	Composite Scales	61
6.5	Hypotheses Testing	62
6.5.1	Correlation	62
6.5.2	Multiple Linear Regression	64
6.5.3	Discussion	69
7	Conclusions	74
7.1	Practical Implications	74
7.2	Limitations and Suggestions for Future Research	76
	References	78
	Appendices	
	Appendix 1. Job Satisfaction and Innovation in Non-Profit Organisations Survey	
	Appendix 2. Main Survey Invitation and Reminders	
	Appendix 3. Mapping of Innovation Variables to Survey Items	

Acronyms and Abbreviations

CFA	C onfirmatory F actor A nalysis
CFI	C omparative F it I ndex
COST	European C ooperation in S cience and T echnology
EC	E uropean C ommission
EFA	E xploratory F actor A nalysis
ERA	E uropean R esearch A rea
ERC	E uropean R esearch C ouncil
ESF	E uropean S cience F oundation
EU	E uropean U nion
FP6	Sixth F ramework P rogramme
FP7	Seventh F ramework P rogramme
IFI	I ncremental F it I ndex
ISSP	I nternational S ocial S urvey P rogram
JDI	J ob D escriptive I ndex
JSS	J ob S atisfaction S urvey
NNFI	N on- N ormed F it I ndex
NFI	N ormed F it I ndex
RMSEA	R oot M ean S quare E rror of A pproximation
StD	S tandard D eviation
TLI	T ucker– L ewis I ndex
VFI	V ariance I nflation F actors

List of Figures

Figure 1: “Innovation” in Titles (Fagerberg 2003: 22)	16
Figure 2: Employee-level resources associated with innovation (Patterson et al. 2013: 164)	23
Figure 3: Hypothesised relationships between facets of job satisfaction and the innovation dimensions	32
Figure 4: Technological Innovation Measure	45
Figure 5: Administrative Innovation Measure	46
Figure 6: Job Satisfaction Facets Measures	47
Figure 7: Gender and Job Satisfaction Facets (F = Female, M = Male)	51
Figure 8: Tenure and Job Satisfaction Facets	52
Figure 9: Hypothesized Model for Confirmatory Factor Analysis	56
Figure 10: Factor Loading Estimates – 5 Administrative and 4 Technological Innovation Items (<i>CFA-Model 1</i>)	57
Figure 11: Factor Loading Estimates – 5 Administrative and 3 Technological Innovation Items (<i>CFA-Model 2</i>)	58
Figure 12: Factor Loading Estimates – 4 Administrative and 3 Technological Innovation Items (<i>CFA-Model 4</i>)	61
Figure 13: Automatic Linear Modelling: Predictor Importance	69
Figure 14: Relationships between facets of job satisfaction and the innovation dimensions	70

List of Tables

Table 1. Summary of various facets of job satisfaction as outlined by researchers	14
Table 2. Summary of facets of job satisfaction and their relation to innovation	26
Table 3: COST SWOT Analysis	37
Table 4. Participant demographic information ($N = 34$)	43
Table 5. Participant demographic information without newcomers ($N = 30$)	43
Table 6. Descriptive Statistics ($N = 30$)	50
Table 7. Technological Innovation's Inter-Item Correlation Matrix and Item-Total Statistics	54
Table 8. Cut-off Criteria for Several Fit Indexes (Schreiber et al. 2006: 330; Hooper et al. 2008: 53-54)	59
Table 9. <i>CFA-Model 2</i> Modification Indices: Covariances	60
Table 10. Correlation Matrix ($N = 30$)	63
Table 11. Regression Analysis of Administrative and Technological Innovations ($N = 30$)	65
Table 12. Hierarchical Regression Analysis of Administrative and Technological Innovations ($N = 30$)	67

1 Introduction

In order to ensure their survival, non-profits, perhaps more than organisations in the private or public sector, must address the economic and sustainability challenges that will ultimately change the way they do business. Rapid environmental changes and unpredictable funding patterns have resulted in the demise of many non-profits, and only those non-profits that possess resources, human capital, market share, and diverse revenue streams will prevail. To compete for these scarce resources, non-profits will be required to become ever more strategic in the ways they accomplish their mission. (Mesch 2010: S173)

Research indicates that organisations need to be more flexible, adaptive, entrepreneurial and **innovative** in order to effectively meet the changing demands of today's environment (Sarros 2011: 291). In addition, innovation has been identified as an important capability for the long-term success of non-profit organisations in order to face the uncertain economic times and the growing societal demands (Beekman et al. 2102: 22).

Looking at the near past, one can see that most of the talking and thinking around innovation was about technologies, R&D, processes and structures. However, fundamentally, innovation starts and ends with human beings and organisations have started to figure this out too. Firstly, most organisations were involved with introducing processes, such as stage gate, to manage innovation effectively and the understanding of innovation seemed primarily focused around technology and products. Secondly, it seemed that the discussion had moved on to what kind of structures and roles were needed to support innovation. Thirdly, many organisations had broadened their understanding of innovation and were also seeking "new ways of doing business"; many had also realised that processes and structures alone would not make a real difference, and that they would have to take a closer look at values and behaviours (e.g. culture), and leadership styles. While they are helpful, it is not processes that make innovation happen, it is people. In consequence, there is a need for a human-centric approach to and understanding of innovation. (Stamm & Trifilova 2009: 182)

On the other side, the ways in which people, who are working in the context of non-profit organisations, actualise the strategy of the organisation depend on their motivation, training, behaviour and **job satisfaction** (Akingbola 2005: 44).

1.1 Research Question

Various studies have concluded that job satisfaction and performance are related and can be predicted from each other (Ostroff 1992; Judge et al. 2001; Rose 2009). Moreover, Lee et al. (2013: 2) suggest that higher level of job satisfaction is beneficial for companies to promote innovation climate and innovation activities. Taking into account these findings and the review of the previous paragraphs it seems that job satisfaction is tied to innovation, which is vital for the long-term success of the non-profit organisations.

However, job satisfaction is a multidimensional concept (Edwards 2008: 446). Hence, within this framework it is plausible that the satisfaction and innovation relationship may vary as a function of the *facets* of satisfaction. Identifying the facets that are related to innovation could potentially help an organisation to focus on those facets that best nurture innovation.

Considering that while the literature on innovation is extensive in the business sector but much work has to be done in the non-profit and government sectors (Jaskyte 2011: 77), and, as it is demonstrated in Chapter 3, the existence of minimal research connecting job satisfaction facets with administrative and technical innovation, this study aims to identify the potential relationships. The research question is as follows:

How are job satisfaction facets related to technological and administrative innovations in the context of non-profit organisations?

The results of the study could have implications about how to best cultivate innovation within the workplace and could be used in decision-making concerning employees' well-being. The theoretical model underlying the study is based on literature review and the social exchange theory framework (Homans 1961; Blau 1964; Emerson 1976). The research employees a quantitative method for data gathering based on a case organisation, which is presented in more detail in Chapter 4. The next section demonstrates indicatively the used research approach.

1.2 Research Approach

The research approach that is followed in the current study is based on mixed methods research, "the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a

single study” (Johnson & Onwuegbuzie 2004: 17). Mixed methods research can enable the investigators to address broader or more complicated research questions than the case studies alone (Yin 2009: 64).

In particular, the mixed methods research that is utilised in this report is a case study that calls upon a survey to collect data and factor theory and regression analysis to process them. The next sub-sections delve into the case study and survey study research.

1.2.1 Case Study Research

According to Yin (2009: 18), a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident. Case study research includes both single and multiple case studies and case studies can include quantitative and/or qualitative evidence (Ibid: 19).

1.2.1.1 Components of Research Designs

Yin (2009: 27) notes that for case studies, five components of a research design are especially important, specifically: a study's questions; its propositions, if any; its unit(s) of analysis; the logic linking of the data to the propositions; and the criteria for interpreting the findings. Each of these components is elaborated below and the links with the current study are identified.

Study questions: The case study method is most likely to be appropriate for "how" and "why" questions (Yin 2009: 27). For the current study, the research question is demonstrated in section 1.1.

Study propositions: Each proposition directs attention to something that should be examined within the scope of study and helps identify the relevant information to be collected (Yin 2009: 28-29). The various hypotheses of the current study are defined in section 3.3.

Unit of analysis: This third component is related to the fundamental problem of defining what the "case" is (Yin 2009: 29). The desired case should be some real-life phenomenon, not an abstraction such as a topic, an argument, or even a hypothesis (Ibid: 32). Examples of concrete case studies topics are: individuals, small groups, organisations,

partnerships and less concrete are: communities, relationships, decisions, projects (Ibid: 33). In the current study, the unit of analysis is a non-profit organisation, located in Brussels, Belgium, which is described in detail in Chapter 4.

Linking data to propositions and criteria for interpreting the findings: These components foreshadow the data analysis steps in case of study research, where the case study data are combined or calculated as a direct reflection of the initial study propositions (Yin 2009: 33-34). Yin (2009: 108) notes that if there is a survey within a case study the survey data are analysed in a similar manner to regular surveys.

Furthermore, according to Yin (2003: 14-16), in order to conduct the analysis and account for such complexities as the interactions among independent and dependent variables, researchers may use factor analysis, regression analysis, and analysis of variance as illustrative statistical techniques. (Ibid: 14-16)

The analysis and linking of data to the study's hypotheses in the current research take place in Chapter 6.

1.2.1.2 Quality of Research Designs

Four tests have been commonly used to establish the quality of any empirical social research, and since case studies are one form of such research, the four tests are also relevant to case studies (Yin 2009:40).

Yin (2009: 40) summarises the afore-mentioned tests to: construct validity, which identifies correct operational measures for the concepts being studied; internal validity (only for explanatory or causal studies), which seeks to establish a causal relationship, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships; external validity, which defines the domain to which a study's findings can be generalised and reliability, which demonstrates that the operations of a study – such as the data collection procedures – can be repeated, with the same results.

The reliability and validity concepts within the current research are elaborated further in Chapter 6.

1.2.1.3 Case Study Designs

According to Yin (2009:46-47), there are four types of designs for case studies, namely: single-case designs with single-unit of analysis, single-case designs with multiple units of analysis, multiple-case designs with single-unit of analysis and multiple-case designs with multiple units of analysis.

The current study is a single case with a single-unit of analysis. The rationale behind this is that the case organisation is considered to be a typical example of a non-profit organisation.

1.2.2 Survey Research

Survey research is a specific type of field study that involves the collection of data from a sample of elements drawn from a well-defined population through the use of a questionnaire (Visser et al. 2000: 223).

1.2.2.1 Survey Study Designs

Surveys offer the opportunity to execute studies with various designs, each of which is suitable for addressing particular research questions. Among the several standard designs are the cross-sectional, the repeated cross-sectional, the panel, and the mixed designs. (Visser et al. 2000: 225)

The present study utilises a cross-sectional survey, which according to Visser et al. (2000: 225), involves the collection of data at a single point in time from a sample drawn from a specified population, offers the opportunity to assess relations between variables and cross-sectional data can be used to test casual hypotheses in a number of ways. The survey in question, together with the sampling procedures and the instruments used, is provided in Chapter 6.

1.3 Structure of the Report

This chapter has begun to explore the relationship between job satisfaction and innovation. Chapter 2 looks at the literature for the definitions of job satisfaction, its facets, technical and administrative innovations and sets the scope of these terms within the study. Chapter 3 explores the relationship of job satisfaction and innovation and defines the model that underlies the study. Chapter 4 describes in detail the case organisation and Chapter 5 the instruments that are used in order to acquire information related to job satisfaction facets, technological and administrative innovations from the employees of

the organisation in question. Chapter 6 delves into the employed statistical methodology and presents and discuss the results of the data analysis.

Finally, Chapter 7 presents the limitations of the study and the conclusions summarising the work and indicating how the case organisation could be benefited by the results of the study.

2 Literature Review

A literature review is a means to an end, and not an end in itself. The purpose of a literature review is not to determine the *answers* about what is known on a topic; in contrast, researchers review previous studies to develop sharper and more insightful questions about the topic. (Yin 2009: 14)

The following sections review the literature in order to define job satisfaction, its facets, technical and administrative innovations and outline the scope of these terms within the study.

2.1 Job Satisfaction

Satisfaction has been the focus of a vast literature. In June 2013, a search using the key words "job satisfaction" yielded 36,627 peer reviewed articles in academic/scholarly journals within the EBSCO¹ databases and 44,038 within the ProQuest² databases with the first articles dating back to 1919 and 1945 respectively. In addition, a Google Scholar³ search generated an astonishing 756,000 results.

¹ Academic Search Elite, Business Source Elite, CINAHL with Full Text, CINAHL, Communication & Mass Media Complete, Regional Business News, Library, Information Science & Technology Abstracts, GreenFILE, Education Source

² ABI/INFORM Complete, Accounting & Tax, Advanced Technologies Database with Aerospace, AGRICOLA, AIDS and Cancer Research Abstracts, Applied Social Sciences Index and Abstracts (ASSIA), Aqualine, ARTbibliographies Modern (ABM), ASFA: Aquatic Sciences and Fisheries Abstracts, Banking Information Source, Biological Sciences, Biotechnology and BioEngineering Abstracts, British Humanities Index (BHI), Computer and Information Systems Abstracts, COS Conference Papers Index, Design and Applied Arts Index (DAAI), ebrary® e-books, Electronics & Communications Abstracts, Engineering Research Database, Environmental Impact Statements, Environmental Sciences and Pollution Management, ERIC, Hoover's Company Profiles, International Index to Music Periodicals, International Index to Performing Arts, Library and Information Science Abstracts (LISA), Linguistics and Language Behavior Abstracts (LLBA), Materials Research Database, Mechanical Engineering Abstracts, MEDLINE®, METADEX, National Criminal Justice Reference Service (NCJRS) Abstracts Database, Oceanic Abstracts, PAIS International, Physical Education Index, PILOTS: Published International Literature On Traumatic Stress, ProQuest Asian Business & Reference, ProQuest Biological Science Collection, ProQuest Dissertations and Theses A&I: The Humanities and Social Sciences Collection, ProQuest European Business, RILM Abstracts of Music Literature, Social Services Abstracts, Sociological Abstracts, Solid State and Superconductivity Abstracts, Technology Research Database, Worldwide Political Science Abstracts

³ <http://scholar.google.com>

Despite the extensive attention satisfaction has received, this research has sometimes produced conflicting findings (Westover & Taylor 2010: 812) and broad disagreement persists regarding how best to define and measure it (Nerkar et al. 1996: 169).

The following subsections define job satisfaction, compare global job satisfaction against facets of satisfaction, analyse the relative importance of facets and investigate the job satisfaction in non-profit organisations.

2.1.1 Defining Job Satisfaction

Early research on job satisfaction focused on the affective component of the concept. For example, Locke (1976: 1300) says that job satisfaction is a "pleasurable or positive emotional state resulting from an appraisal of one's job or job experiences". By the mid-1980s, researchers had begun highlighting cognitive (as opposed to affective) definitions of the concept (Yeoh 2011: 7). For instance, Organ & Near (1985: 241) suggest that existing job satisfaction measures reflect primarily cognitive evaluation rather than affective state. Furthermore, Hulin & Judge (2003: 255) have focused "job satisfaction on judgment-based, cognitive evaluations of jobs on characteristics or features of jobs and generally ignored affective antecedents of evaluations of jobs and episodic events that happen on jobs".

The drawback of defining job satisfaction only as cognition is that this definition ignores the decades of research and findings that focused on the affective element of the concept. Therefore, in order to reconcile the large amount of data gathered from initial studies into affective job satisfaction with the newer cognitive approach, researchers proposed instead an attitudinal conceptualization of job satisfaction. (Yeoh 2011: 8)

For instance, Fisher (1998: 3) defines job satisfaction as an attitude, where attitudes are usually described as containing at least two components: an affective (emotional, feeling) component, and a cognitive (belief, judgment, comparison) component. Dalal (2012: 342) defines job satisfaction as "a set of cognitive and affective responses to the job situation". Spector (1997: 2) describes job satisfaction as "the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs", considering it an attitudinal variable. Furthermore, Weis (2002: 174-175) mentions that the definition of job satisfaction as the attitude one holds about one's job is widespread and outlines that an attitude is an evaluation or evaluation judgement made with regard to an attitudinal object.

Based on the above review of the literature, it was decided that for the purpose of this study job satisfaction would be operationally defined according to Weis (2002: 175) as “a positive (or negative) evaluative judgment one makes about one's job or job situation”.

2.1.2 Global Job Satisfaction versus Facets of Satisfaction

Job satisfaction can be considered as a global concept, but it can also be measured as being composed of facets of satisfaction with various aspects of a job (Roelen et al. 2008: 434). This is a widely discussed topic among job satisfaction researchers, for instance: Oshagbemi (1999), Weis (2002), Faragher et al. (2005), Skalli et al. (2007), Dalal (2012).

Examples of aspects of a job are: satisfaction with the supervisor, co-workers, amount of pay and benefits, opportunities for promotion, and nature of the work itself. Weis (2002: 187) extends the definition of the facet so that “any element of work experience that is at all discriminable, that can become an object of thought, can be the subject of evaluation and therefore considered a facet. The desks, the pay, the toupee of your boss are all objects of thought, subject to evaluation”.

The reason for breaking down the whole job satisfaction is that an employee may be content with certain aspects of his/her job while being displeased with others and in consequence this cannot be recognised in case the job satisfaction is observed as a global concept. Moreover, evaluations about certain aspects may predict certain criteria of interest to us where others do not (Weis 2002: 187) and diagnose strengths and weaknesses in various sections of an organisation (Ironson 1989: 194).

In addition, according to Skalli et al. (2007), this approach offers a new perspective in terms of human resource management policies.

For instance, in human resource management there is an emphasis on policies, which increase overall job satisfaction in order to succeed in reducing labour turnover and/or in raising labour productivity. Though, if satisfaction with a particular facet of the job is what really drives labour turnover or productivity then overall job satisfaction is a noisy proxy. This implies that human resource managers should be more concerned in targeting the satisfaction with the relevant facets of a job rather than the overall job satisfaction. (Skalli et al. (2007: 4)

Based on the above review and taking into account the conclusions of Dalal (2012: 343) that “neither global nor facet measures of satisfaction are inherently better” and Oshagbemi (1999: 401) that “if a choice of only one method must be made, the choice of which method to use would depend largely on the objectives of a research”, it was decided that for the purpose of this study job satisfaction is constructed by a number of facets, which are meaningful for the particular research in order to allow pointing at specific areas of satisfaction / dissatisfaction for change initiatives and predicting particular behaviours related to certain aspects of the concept.

The next section discusses the importance of various facets of job satisfaction and defines which of them are going to be utilised by the current study.

2.1.3 Relative Importance of Facets

The afore-mentioned decision about the usage of facets prompts the need to define the facets to consider and use within the study. Nevertheless, it seems that this is a question that has troubled job satisfaction researchers for many years.

For example, the 1994’s Job Satisfaction Survey (JSS) (Spector: 2011) contains nine facets. Ironson et al. (1989: 193-194) report that the 1967’s Minnesota Satisfaction Questionnaire provides scores for 20 aspects of job satisfaction and the 1979’s Quality of Employment Survey measures six features. Taber & Alliger (1995: 102) mention that research has shown that employees develop attitudes toward seven facets.

On the other hand, Suliman (2007:297) states that for most researchers job satisfaction is comprised by five facets, Skalli et al. (2007: 11) report the use of five facets as also the 1969’s Job Descriptive Index (JDI) (Ironson et al. 1989: 193-194; BGSU 2013). Table 1 summarises the afore-mentioned facets of job satisfaction.

It is observable from Table 1 below that many researchers used at least five basic facets, namely: pay, promotion, supervision, co-workers and the work itself, and although others may include additional facets, these five are almost always included.

Table 1. Summary of various facets of job satisfaction as outlined by researchers

JSS	Quality of Employment Survey	JDI (BGSU 2013)	Taber & Al-liger (1995:102)	Skalli et al. (2007: 11)	Suliman (2007: 297)
Pay	Financial Rewards	Pay	Pay	Earnings	Pay
Promotion	Promotions	Promotions	Promotion opportunities		Promotion opportunities
Supervision		Supervision	Supervision		Quality of supervision
Co-workers	Relations with co-workers	Co-workers	Co-workers		Relationships with co-workers
Nature of Work		Work itself	Work itself	Type of work	Work itself
Fringe Benefits			Benefits		
Contingent Rewards					
Operating Procedures			Company Policies		
Communication					
	Challenge				
	Comfort				
	Resource Adequacy				
				Job Security	
				Working Conditions	
				Working Times	

Additionally, Sousa-Poza & Sousa-Poza (2000:529) analysed the levels and determinants of job satisfaction utilising the wide data set on Work Orientations from the 1997 International Social Survey Program (ISSP) concluding in the following ranking of job attributes importance: first "Interesting job", second "Good relations with management", third "Can work independently", fourth "Good relations with colleagues", fifth "Income is

high”, sixth “Good advancement opportunities” and seventh “Job is secure”. The advancement⁴ definition in Cambridge Business Dictionary says that advancement is “the process of improving your career, for example, by getting a more important position within an organization or by moving to another company for a better job”, thus advancement encompasses promotion.

It is noticeable from the above review that the five basic facets are almost always referred to, since the nature of the work itself includes “job challenge, autonomy, variety, and scope” (Saari & Judge 2004: 397), i.e. it encompasses the first and third of the aforementioned attributes according to Sousa-Poza & Sousa-Poza.

2.1.3.1 Job Satisfaction and Non-profit Organisations

The literature review of research related to job satisfaction and non-profit organisations does not reveal the use of special facets in the case of non-profits, for instance Deshpande (1996) and Schroffel (1999) utilise the afore-described five basic facets in their studies.

As a result, it was decided to focus in this study on the five facets, along with a facet targeting job security, which was shown by various researchers – for example: Ashford et al. (1989: 819), Yousef (1998: 185), Appelbaum (2000: 758), Probst (2003: 464) – to be noticeably related to job satisfaction. Hence, the particular job satisfaction facets are: the nature of work itself, advancement opportunities, income, relationships with management and colleagues and job security.

The next section presents the literature review regarding innovation and its various typologies.

2.2 Innovation

Innovation is not a new phenomenon, however, it has not always got the scholarly attention it deserves. Nevertheless, research on the role of innovation economic and social change has flourished in recent years, particularly within the social sciences, and with a focus on cross-disciplinarity. Figure 1 illustrates the much faster increase in the number

⁴ <http://dictionary.cambridge.org/dictionary/business-english/advancement?q=advancement>

of social-science publications focusing on innovation compared to the total number of such publications. (Fagerberg 2003: 2)

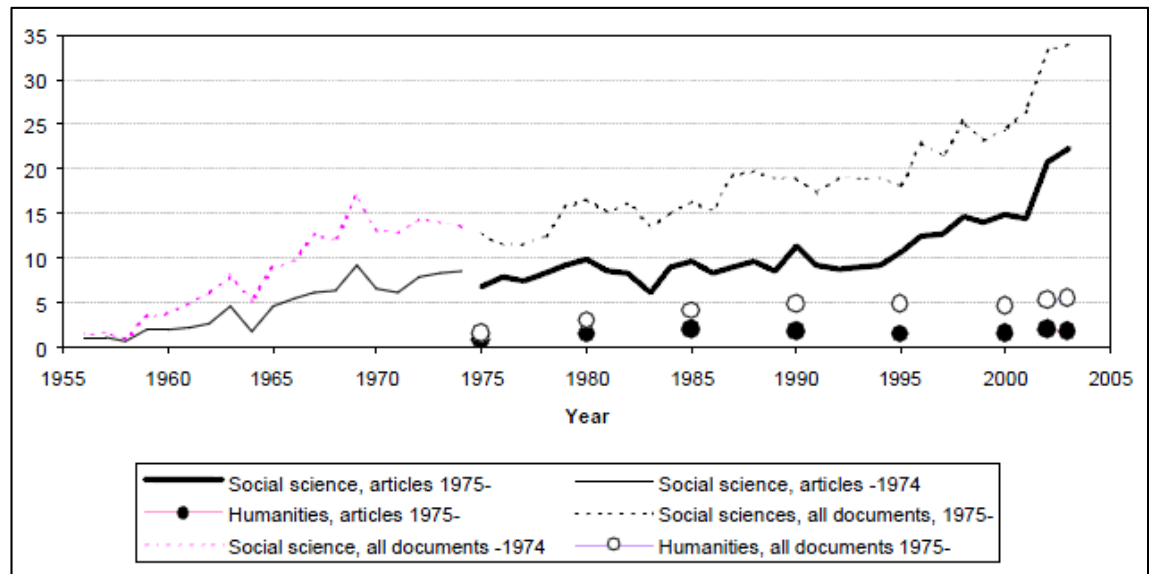


Figure 1: "Innovation" in Titles (Fagerberg 2003: 22)

Likewise, Job Satisfaction in June 2013, a search using the key words "role innovation economic social change" yielded 116,305 peer reviewed articles in academic/scholarly journals within the EBSCO¹ databases and 66,675 within the ProQuest² databases limiting the year range from 1955 to 2013. In addition, a Google Scholar³ search generated the enormous 1,230,000 results.

The following subsections define innovation, examine the various typologies of innovation, and investigate innovation in non-profit organisations.

2.2.1 Definitions of Innovation

Innovation is studied at different levels of analysis (Damanpour 2010: 997; Subramanian & Nilakanta 1996: 631) and has been conceptualized in many different ways (Damanpour & Aravind 2012: 425). Innovation research has been conducted in disciplines such as organisational psychology, anthropology, sociology, education, economics, business administration with a division into marketing and organisational theory and strategic management areas, etc. (Subramanian & Nilakanta 1996: 631; Patterson et al. 2013: 163).

Paradoxically, one of the few aspects of the literature consistently agreed upon is that there is confusion over definitions of innovation (Patterson 2002: 116), potentially due to the fact that different academic disciplines have explored the concept of innovation from different perspectives but regularly ignore findings from other disciplines (Patterson et al 2013: 163).

For instance, Osborne (1998: 1137) defines innovation in social policy as “the introduction of new knowledge into a service system and its application, though not its discovery”. Likewise, Fagerberg (2003: 3) mentions that innovation is distinct from invention, where invention is the first occurrence of an idea for a new product or process and innovation is the first commercialisation of the idea.

Patterson et al. (2013: 165), as psychologists, utilise in their particular study the following definition of innovation:

The intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to specifically benefit the individual group, organisation or wider society.

According to Han et al. (1998: 32), in marketing, the conventional meaning of the term “innovation” largely refers to new product-related developments. Furthermore, F. Damanpour⁵, a researcher with many publications in the area of management of innovation and technology, evolves over time the definition of innovation he uses within his research at the organisational level. In particular, innovation is defined as: “the implementation of an idea – whether relating to a device, system, process, policy, program, or service – that is new to the organization at the time of adoption” (Damanpour 1987: 676), “adoption of an internally generated or purchased device, system, process, policy, program, service, or product that is new to the adopting organization” (Damanpour 1991: 556), “the generation (development) and adoption (use) of new ideas or behaviours, where a new idea could relate to a new administrative system product, production process, service, or organizational structure” (Damanpour 2010: 997, Damanpour & Aravind 2012: 425).

Last but not least, Tidd & Bessant (2011: 16) view innovation as “a process of turning opportunity into new ideas and of putting these into widely used practice”.

⁵ <https://www.business.rutgers.edu/faculty-research/directory/damanpour-fariborz>

Nevertheless, regardless of the numerous definitions of innovation the two core aspects of all of them are concerned with its newness and its relationship to carrying it out in practice. Of interest here is innovation in the context of organisations.

2.2.2 Innovation Typologies

The distinction between innovation types has been attributed to Schumpeter's early work (Damanpour & Aravind 2012: 426). Schumpeter distinguished between five different types; new products, new methods of production, new sources of supply, exploitation of new markets and new ways to organise business (Fagerberg 2003: 4). Yet, most studies of innovation, especially those conducted by economists and technology management researchers, have focused on the first two types making the product – process typology the most widely studied innovation typology (Damanpour & Aravind 2012: 426). However, the focus on product-process innovations, while useful for the analysis of some issues, ignores other important aspects of innovation, such as the organisational kind, involving entirely new ways to organize production and distribution (Fagerberg 2003: 5).

Tidd & Bessant (2011: 21) in their book "Managing Innovation" focus on four broad categories of innovation, namely: product innovation (changes in the products/services that an organisation offers), process innovation (changes in the ways in which they are created and delivered), position innovation (changes in the context in which the products/services are introduced) and paradigm innovation (changes in the underlying mental models which frame what the organisation does).

Another approach, also based on Schumpeter's work, has been to classify innovations according to how radical they are. From this perspective continuous improvements are often characterised as incremental or marginal innovations, as opposed to radical innovations or technological revolutions. Debatably, the bulk of economic benefits come from incremental innovations and improvements. (Fagerberg 2003: 5)

An additional, widespread, typology of innovation, especially among organizational sociologists and management researchers, has been the technological – administrative typology (Damanpour & Aravind 2012: 426). According to Damanpour (1987: 677) the distinction between technological and administrative innovations is the most fundamental for studies of organisational innovations because the typology depicts the differences in

the nature of innovation, and the two innovation types together can represent changes introduced in a wide range of tasks within the organisation.

Moreover, Damanpour & Aravind (2012: 426) discuss also a typology that puts next to each other the product – process and the technical – administrative typologies dividing the category of process innovation into technological process innovations and organisational process innovations. However, according to Fagerberg (2003: 5) organisational innovations are not limited only to new ways to organise the process of production within a given firm.

Adding to the typology confusion, Damanpour & Aravind (2012: 429-432) refer to managerial innovation and define it as “new approaches in knowledge for performing the work of management and new processes that produce changes in the organisation’s strategy, structure, administrative procedures, and systems”, which encompasses organisational, administrative and management innovations. Besides, Damanpour et al. (2013: 290) recommend that more refined research should take place on typologies of managerial innovation in order to acquire a better understanding of its generation and adoption.

2.2.2.1 Innovation and Non-profit Organisations

The distinction between non-profit organisations and private firms may blur when considering innovation because though enterprises may compete for the devotions of their markets through offering of new products or services, non-profit organisations use innovation to help them *compete* against the challenges of, for instance, delivering healthcare, education, law and order, having a different underlying model. (Tidd & Bessant 2011: 60)

While the literature on innovation in the private business sector is extensive, innovation in non-profit organisations seems to be a field where very little research has occurred, bearing also in mind that the innovation models developed out of data coming from private organisations may not be easily transferred into the non-profit context. (Zimmermann 1999: 614; Jaskyte 2011: 77)

In addition, Jaskyte (2011: 78) reports that although the variety of different innovation typologies, the technological and administrative innovations are believed to be of primary importance for the effectiveness of non-profit organisations.

Taking into account the above review and utilising the innovation definitions of Damanpour (1987: 676) and Jaskyte (2002: 8) the present study focuses on technological and administrative innovations. Administrative innovation denotes the implementation of a structure, process, system, or policy in the administrative core of an organisation that is new to the usual organisational practice. It is oriented towards the efficiency and effectiveness of the organisation's management processes and administrative systems (Damanpour & Aravind (2012: 428). On the other hand, technological innovation is directly related to organisation's primary work activities and produces changes mainly in its operating systems (Damanpour & Aravind (2012: 426). It is defined as the implementation of a service or a program that is new to the usual organisational practice.

The next chapter explores the relationship of job satisfaction and innovation and defines the model that underlies the study.

3 Job Satisfaction and Innovation Model

Innovation has nothing to do with how many R&D dollars you have...
It's not about money. It's about the people you have, how you're led,
and how much you get it. Steve Jobs (Kirkpatrick 1998)

As it was mentioned in Section 1.1 it seems that job satisfaction is tied to innovation, which is vital for the long-term success of the non-profit organisations. However, further analysis is needed in order to determine the relationship of job satisfaction, in particular job satisfaction facets, and innovation.

The following sections examine the factors that influence innovation, analyse the relationship of job satisfaction with innovation, and define the job satisfaction facets – technical and administrative innovations model that underlies the study.

3.1 Factors Affecting Innovation

There is agreement among the innovation scholars that the enormous and extensive research on innovation can be classified into different levels of analysis. According to Patterson et al. (2013: 163) these levels are the individual (or employee), group, managerial and organisational. On the other side, Damanpour & Aravind (2012: 424) mention the individual, group, organisation, industry and economy.

In his multi-cited work, Damanpour (1991: 557) notes that the organisational aspects are the most widely studied. In consequence, the innovation determinants from the organisational-level perspective shall be investigated firstly.

Damanpour (1991: 558-559) focuses on thirteen factors that have either a positive or negative relationship to innovation (administrative and technological), namely: specialisation, functional differentiation, professionalism, formalisation, centralisation, managerial attitude towards change, managerial tenure, technical knowledge resources, administrative intensity, slack resources, external communication, internal communication and vertical differentiation. In addition, Damanpour (1991: 578) suggests that different types of organisation (non-profit and for profit business) are affected differently by various factors.

Moreover, Jaskyte (2010), based on theoretical and empirical works, identifies the organisational factors that affect positively or negatively innovation dividing them into three

groups: internal structural characteristics (hierarchy, formalisation, centralisation, specialisation and size and resources), organisational culture (culture strength, cultural norms and values, e.g. risk taking, experimentation, etc., and culture structure) and leadership. (Jaskyte 2010: 486 – 487)

From the above literature review, it seems that there is not any identified direct relationship between job satisfaction and innovation at organisational level. Due to this limitation, we are going to examine the factors that, according to literature, affect innovation at managerial, team/group and individual level.

Damanpour & Aravind (2012: 440-441) summarise the commonly cited antecedents of managerial innovation, which have been examined in two or more studies, in formalisation, centralisation, organisational complexity, organisational size, managers' tenure, managers' education and market competition.

On the other hand, Anderson et al. (1992: 17-18) report that a thorough review of the social psychological literature resulted in the development of a four-factor theory of team innovation where the identified factors are: vision, participative safety, climate for excellence and support for innovation.

Patterson et al. (2013) approach innovation with an analysis at the individual (employee) level. Figure 2 identifies the relevant factors at the level of the employee, comprising intelligence and cognition, personality, motivation, knowledge, behaviours, mood states and emotional intelligence. (Patterson et al. 2013: 163 – 165)

Last but not least, Tidd & Bessant (2011: 100) demonstrate a set of components appearing at different analysis levels that seem linked with innovation success. In particular, shared vision, leadership and the will to innovate, appropriate structure, key individuals, effective team working, high-involvement innovation, creative climate and external focus.

Based on the above it is concluded that regardless of the level of analysis of innovation, e.g. individual, team, managerial, organisation, there is no reference to job satisfaction within the widely accepted literature factors that are related to innovation.

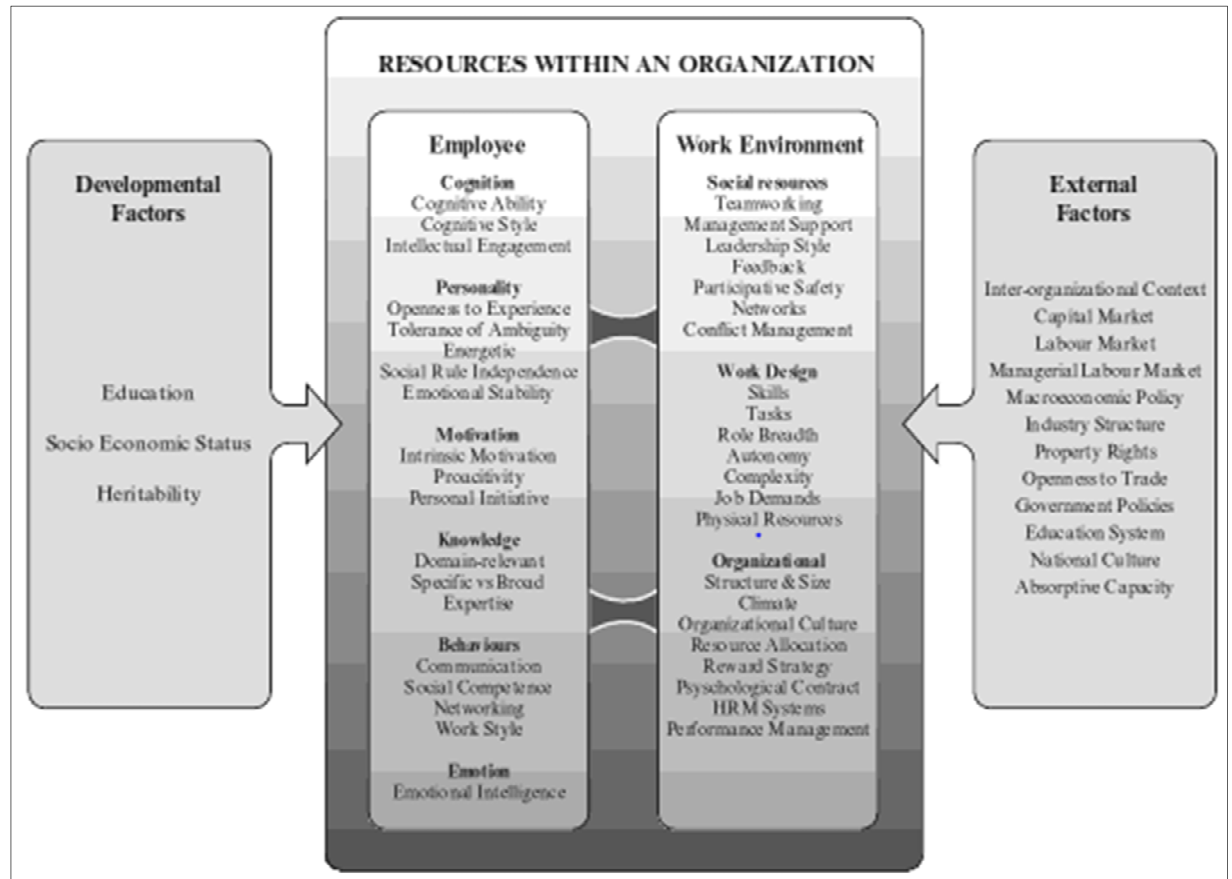


Figure 2: Employee-level resources associated with innovation (Patterson et al. 2013: 164)

In the next section, the study delves further into various literature models trying to identify relationships between job satisfaction and innovation.

3.2 Relationship of Job Satisfaction with Innovation

In order to identify whether there are studies with information regarding the direct relationship between job satisfaction and innovation the EBSCO¹ and ProQuest² databases, mentioned earlier, plus the ScienceDirect⁶ database were utilised. The query was limited to peer reviewed / scholarly journals with available full text, had two keywords “job satisfaction” and “innovation” and these keywords were searched into the abstract or the title of the publications.

In July 2013, EBSCO returned 24 results, ProQuest 23 and ScienceDirect 21 with various publications appearing in all the groups of results. It is worth keeping in mind that

⁶ ScienceDirect is a leading full-text scientific database offering journal articles and book chapters from more than 2,500 peer-reviewed journals and more than 11,000 books.

within the relevant results there was no division of innovation to any of the afore-mentioned typologies, including the technological – administrative, which this study focuses on. The next paragraphs summarise the established results.

Nerkar et al. (1996) disaggregate the satisfaction concept to instrumental, social and egocentric. Instrumental satisfaction means the extent to which individuals are satisfied with task accomplishment in their teams; social satisfaction reflects the content with the working relations and interactions between organisational members and egocentric reflects the extent to which individuals perceive that they personally stand to benefit from their participation in an innovation project (Nerkar et al. 1996: 171). The researchers conclude that there is no effect between egocentric satisfaction and innovation, social satisfaction is critical to innovation and instrumental dissatisfaction appears to obstruct innovation (Nerkar et al. 1996: 181).

In addition, Shipton et al. (2006) in a longitudinal study show that aggregated job satisfaction, which was produced from summarising individual employees' job satisfaction, when it is tied to high job variety and low hierarchy or status differential, it is a significant predictor of organisational innovation, i.e. job satisfaction increases innovation.

Furthermore, McKinnon et al. (2003: 39) state that innovation has strong association with job satisfaction, Lee & Chang (2008: 210) conclude that job satisfaction caused by external recognition will promote innovative abilities among employees, Crespell & Hansen (2008: 6) mention that "job satisfaction shows positive and significant correlations with climate for innovation", the results of the study of Lee & Chang (2008b: 738) suggest that "an organisational culture that promotes job satisfaction will release the kind of innovation and creativity that the industry needs" and Sledge et al. (2008: 1667) report that job satisfaction has been associated with positive organisational outcomes such as higher innovation.

In consequence, it is relatively safe to assume that there is a positive relationship among overall job satisfaction and overall innovation. However, taking into account Section 2.1.2 where is defined that for this study job satisfaction is considered as being constructed by a number of facets, the particular deduction is not very helpful. Considering also that from the above literature review only the study of Nerkar et al. (1996) refers to facets of job satisfaction it might be worth investigating the relationship in question from different angles.

3.2.1 Job Satisfaction, Motivation and Innovation

Various researchers highlight the relation of job satisfaction and motivation. For instance, Sledge et al. (2008: 1667) consider motivation to be a primary determinant of job satisfaction, Springer (2011: 37) identifies as significant the correlation between job satisfaction and job motivation and Cun (2012: 338) concludes that public service motivation significantly influences job satisfaction. In consequence, one angle to consider the connection between job satisfaction facets and innovation is through the prism of motivation.

It was mentioned above that Patterson et al. (2013) consider motivation necessary for innovation. Exploring further the particular study one can acknowledge that motivation is divided into intrinsic and extrinsic. It is also reported that while intrinsic motivation is an important prerequisite for innovation, the role of extrinsic is less clear. (Patterson et al. 2013: 170)

Sauermann & Cohen (2010: 2135) state that individuals are extrinsically motivated if they seek to obtain benefits that are provided by some environmental entity and intrinsically motivated if they seek to obtain benefits that originate from within the individual or the activity itself – not the environment. According to Herzberg (1987: 92) among the intrinsic motivators are *the work itself*, and growth or *advancement* and the extrinsic include *supervision, interpersonal relationships, salary and security*. On the contrary, Sauermann & Cohen (2010: 2138) mention that motives, such as career advancement and job security, may have intrinsic as well as extrinsic aspects. However, overall, within the intrinsic and extrinsic motivators we can directly identify the job satisfaction facets defined earlier (see section 2.1.3), specifically: income, advancement, supervision, co-workers, the work itself and job security.

In addition, Sauermann & Cohen (2010) analyse the impact of employee motivation on organisational innovation and performance. Findings suggest that motives regarding intellectual challenge, independence, and income have a strong positive relationship with innovative output, whereas motives regarding job security tend to have a negative relationship (Ibid: 2134). No significant effects of the motives of career advancement have been found (Ibid: 2142). Hence, we can identify again several job satisfaction facets and their relation to innovation, keeping in mind that intellectual challenge and independence are included within the work itself facet (Saari & Judge 2004: 397).

3.2.2 Individual Facets of Job Satisfaction and Innovation

Another approach to identify the relation among job satisfaction facets and innovation is to consider the various facets individually within various studies. For instance, Jaskyte (2002: 77) concludes that security has a negative relation to innovation, which agrees with the findings of (Sauermann & Cohen 2010).

Furthermore, Scott & Bruce (1994: 600) identify the positive connection between innovative behaviour and the quality of the supervisor – subordinate relationship. They report that “high-quality dyadic relationships may give subordinates the level of autonomy and discretion necessary for innovation to emerge”.

In addition, Scott & Bruce (1994: 602) test whether the quality of the working relationships between individuals and their work groups affect innovative behaviour but they are not able to identify any relation.

As far as the career advancement is concerned, Mak & Akhtar (2003: 515) conclude that internal career opportunity does not significantly correlate with innovation strategies, which is in accordance with the findings of Sauermann & Cohen (2010).

The next section explores the relationships of job satisfactions facets and innovation and determines the model of the study.

3.3 Model Underlying the Study

The findings of Sections 3.2.1 and 3.2.2 are summarised in Table 2 below, where “+” indicates a positive relation between a particular job satisfaction facet and innovation, “-” means a negative relation, “0” no relation and “?” an unclear relation.

Table 2. Summary of facets of job satisfaction and their relation to innovation

Facets	Patterson et al. (2013)	Sauermann & Cohen (2010)	Jaskyte (2002)	Scott & Bruce (1994)	Mak & Akhtar (2003)
Income		+			
Advancement	?	0			0
Supervision				+	

Facets	Patterson et al. (2013)	Sauermann & Cohen (2010)	Jaskyte (2002)	Scott & Bruce (1994)	Mak & Akhtar (2003)
Co-workers				0	
Nature of Work	+	+			
Security		-	-		

In the next subsections the relationships of each individual facet with technological and administrative innovations are defined.

3.3.1 Advancement

Based on the above deductions it is noticeable that there is no clear relation between advancement opportunities and overall innovation, and thus it is hypothesised that there is no relation between advancement and either technological or administrative innovation. In other words:

Hypothesis 1a (H_{1a}): Satisfaction with the opportunities for advancement is unrelated to technological innovation.

Hypothesis 1b (H_{1b}): Satisfaction with the opportunities for advancement is unrelated to administrative innovation.

3.3.2 Co-workers

Since there is no relation between co-workers (relationship with colleagues) and overall innovation it is also assumed that there is no relation between co-workers and either technological or administrative innovation. In other words:

Hypothesis 2a (H_{2a}): Satisfaction with the relation with colleagues is not related to technological innovation.

Hypothesis 2b (H_{2b}): Satisfaction with the relation with colleagues is not related to administrative innovation.

3.3.3 Supervision

Supervision (relationship with management) is positively related to overall innovation. In addition, Jaskyte (2011: 84), in her study of predictors of administrative and technological innovation in non-profit organisations, finds a positive relationship between transformational leadership and both administrative and technological innovations, where transformational leadership is defined as “a set of practices employed for developing relationships between leaders and employees”. Therefore, it is hypothesised that there is a positive relation between supervision and both technological and administrative innovations. In other words:

Hypothesis 3a (H_{3a}): Satisfaction with the relation with the manager is positively related to technological innovation.

Hypothesis 3b (H_{3b}): Satisfaction with the relation with the manager is positively related to administrative innovation.

3.3.4 Nature of work

Although there is a positive relation between nature of work and innovation, it is not possible to identify clear relations between the particular facet and technological and administrative innovations, regardless of the extended research through the literature using the afore-mentioned databases and search engines. In order to overcome this problem the principles of social exchange theory are applied.

Exchange theory has been one of the major theoretical perspectives in the field of social psychology since the early writings of Homans (1961), Blau and Emerson. This theoretical orientation is based on earlier philosophical and psychological orientations deriving from utilitarianism on the one hand and behaviourism on the other. (Cook & Rice 2003: 53)

According to Emerson (1976: 336), social exchange theory is not a theory at all but a frame of reference within which many theories – some micro and some more macro – can speak to one another, whether in argument or in mutual support. The scope condition for the exchange frame of reference has been most simply defined by Blau (1964. **Cited in:** Emerson 1976: 336): “Social exchange as here conceived is limited to actions that are contingent on rewarding reactions from others.” Implied is a two-sided, mutually dependent, and mutually rewarding process involving “transactions” or simply “exchange” (Emerson 1976: 336). In other words, actors are viewed as acting in terms of anticipated

rewards that benefit them and they incline to choose that alternative course of action that maximises benefit (Cook & Rice 2003: 55).

Furthermore, Homans (1976: 43. **Cited in:** Emerson 1976: 340) states the Rationality Proposition: "In choosing between alternative actions, a person will choose that one for which, as perceived by him at the time, the value, V , of the result, multiplied by the probability, p , of getting the result, is the greater."

Taking into account the positive relation of nature of work with innovation, the division of innovation to technological and administrative and the rationality proposition, it is posited that, due to the satisfaction with the nature of his/her work, an employee will choose to have innovative performance related to either technological OR administrative innovation OR both technological and administrative innovations based on the maximisation of the rate "value of the result" x "probability of getting the result". Let's assume V_1 and V_2 the "value of the result" and p_1 and p_2 the "probability of getting the result" in case of choosing technological and administrative innovations respectively.

According to Damanpour & Schneider (2009: 512), the administrative innovations are indirectly related to the primary work activity and are more directly related to management (e.g., innovations in structure, management processes, reward systems) and as such, administrative innovations might be less costly and less complex to adopt in public organisations than technological innovations. In consequence, V_2 is probably less than V_1 .

In addition, Jaskyte (2011: 78) mentions that administrative innovations tend to be implemented top-down. On the other hand, technological innovation is directly related to organisation's primary work activities, which might be closer to the nature of the work of the employee and influenced by it. Consequently, p_2 will be less than p_1 for the majority of the employees unless they belong to senior management of the organisation, i.e. the probability for the employee in getting the result in the case of technological innovation is higher than in the case of administrative.

Hence, $V_1 \times p_1$ is greater than $V_2 \times p_2$ and the employee will choose the technical innovation over administrative. The question that arises now though is whether he/she will choose both over technological innovation. Emerson (1976: 349) mentions that one of

the two basic meanings of cost in social exchange theory is in the form of rewards foregone e.g. time and effort that could have been spent otherwise, for some other valued return. Assuming that the employee will distribute equally his/her effort and time between both technological and administrative innovation and considering, based on the above, that the reward of the administrative innovation is going to be low it is entailed that the corresponding cost is going to be high and in consequence, the overall reward of employee choosing both innovations is less than the reward of choosing only the technological innovation.

Thus, it is hypothesised that there is a positive relation between the nature of work and technological innovation and no relation between the former and the administrative innovation. In other words:

Hypothesis 4a (H_{4a}): Satisfaction with the nature of the work itself is positively related to technological innovation.

Hypothesis 4b (H_{4b}): Satisfaction with the nature of the work itself is not related to administrative innovation.

3.3.5 Income

Proceeding with the social exchange theory, Janssen (2000: 297) concludes that the extent to which employees actually respond innovatively to job demands is regulated by perceptions of effort-reward fairness. Therefore, if employees are satisfied with their income, they will be satisfied with the fairness of pay. Assuming that one's pay is the same regardless of the technological or administrative innovations and since, as it was mentioned above, there is a positive relation between the aspect of income and innovation, it is hypothesised that there is a positive relation between income and both technological and administrative innovations. In other words:

Hypothesis 5a (H_{5a}): Satisfaction with the income is positively related to technological innovation.

Hypothesis 5b (H_{5b}): Satisfaction with the income is positively related to administrative innovation.

3.3.6 Security

Sauermann & Cohen (2010: 2138) mention that although job security is often considered a characteristic of jobs, it can be conceptualised as reward that is contingent upon individuals' effort or performance. They also observe that job security is linked to risk aversion that may diminish creativity (Ibid: 2145).

Bearing in mind that technological innovation is directly related to organisations' primary work activities, its implementation could entail more risks for the existence of the organisation and in consequence may lead individuals to avoid pursuing it in order to avoid losing security. On the contrary, as it was mentioned earlier, the administrative innovations are indirectly related to the primary work activity and might be less costly and complex to implement in public organisations, which entails less risk for their implementation. Furthermore, since part of the administrative innovations are employee performance evaluation systems, employee incentive / reward systems, etc. employees who are satisfied with the stability of their work will probably be keen on participating, implementing and adopting innovations affecting the rewards they receive.

In consequence, it is assumed that the facet of job security is negatively related to technological and positively related to administrative innovations. In other words:

Hypothesis 6a (H_{6a}): Satisfaction with the security of the job is negatively related to technological innovation.

Hypothesis 6b (H_{6b}): Satisfaction with the security of the job is positively related to administrative innovation.

3.4 Conceptual Model

Overall, the afore-described hypothesised relations at the facet level are presented in Figure 3, which depicts the model that underlies the current study.

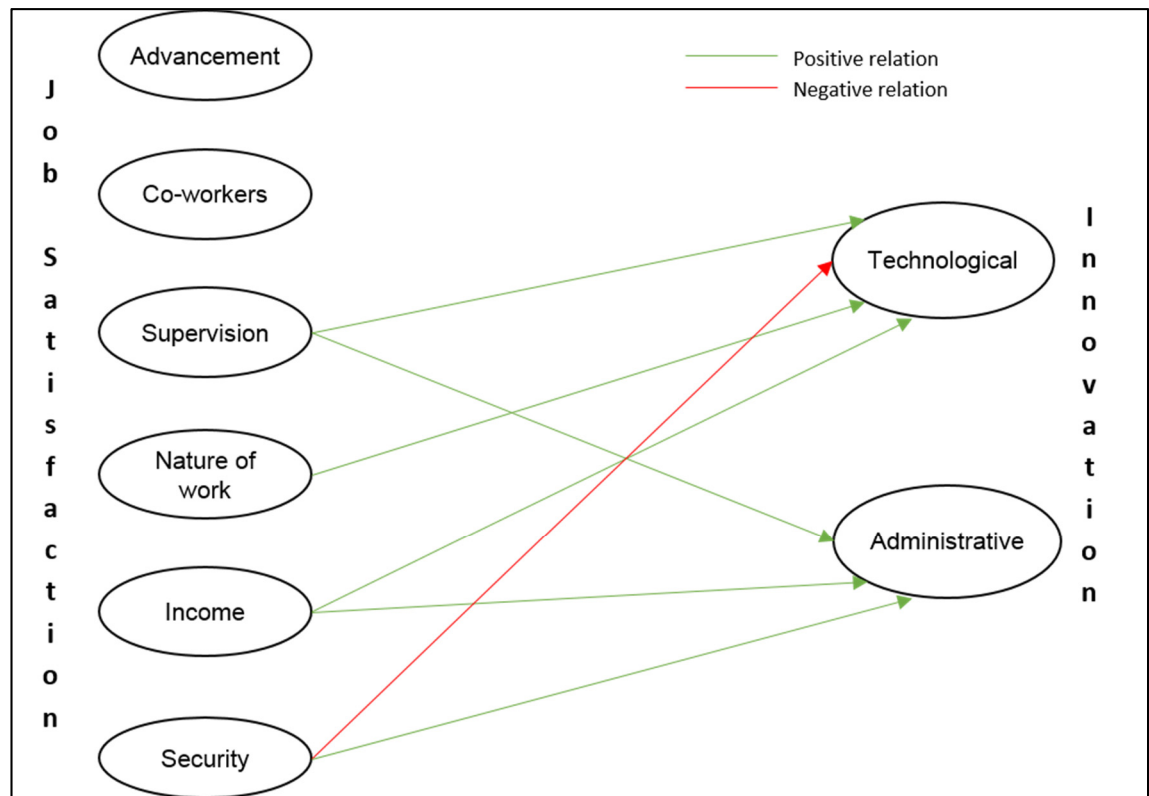


Figure 3: Hypothesised relationships between facets of job satisfaction and the innovation dimensions

The next chapter describes in detail the case organisation, its business sector and customers, its competitors and present market position and demonstrates the need for innovation.

4 The Case Organisation

Founded in 1971, COST – European Cooperation in Science and Technology – is the first and widest European framework for the transnational coordination of nationally funded research activities. It is based on an intergovernmental agreement between 35 European countries. COST's mission is to strengthen Europe's scientific and technical research capacity by supporting cooperation and interaction between European researchers, covering both basic and more applied or technological research and including research addressing issues of pre-normative nature or of particular societal importance. (COST Office 2013: 5)

The European Commission had supported the operational secretariat for COST (COST Office) until 2002. Since then, the European Science Foundation (ESF⁷), on the basis of a contract under FP6⁸ and a Grant Agreement (GA) under FP7² with the European Commission, has been the implementing agent for COST, also supporting the COST Office.

The COST Office delivers the administration and secretarial support to Domain Committees, implementing decisions of its governing board, preparing an annual activity plan and budget, and providing financial support, public relationships and dissemination to actively develop the COST initiative. The Office is responsible for the management of scientific proposals, the organisation of the selection process, contract management, monitoring and the evaluation of actions and the dissemination of results. (Horvat et al. 2010:21)

Currently COST Office is in the process of becoming an autonomous entity. Throughout this study, COST and COST Office are interlinked and they should be perceived as parts of the same entity.

The next sections describe the market in which the organisation operates taking into account the business sector, customers, the main competitors and the present position

⁷ ESF is an independent, non-governmental organisation dedicated to pan-European scientific net-working and collaboration (<http://www.esf.org>)

⁸ The EU's Framework Programme for Research and Technological Development is a major tool to support the creation of the European Research Area (ERA).

COST holds in that market. SWOT analysis is utilised and its results are presented at the end of the chapter.

4.1 Business Sector and Customers

As it was mentioned earlier, COST is an intergovernmental framework for European Cooperation in Science and Technology, allowing the coordination of nationally-funded research on a European level. It contributes to reducing the fragmentation in European research investments and opening the European Research Area (ERA) to cooperation worldwide. Since 2003, COST has been funded by the European Commission's Framework Programmes FP6 and FP7. In FP6, the contribution was €80 million and in FP7, it is €250 million (Horvat et al. 2010: 20).

COST does not fund research itself, but provides support for networking activities carried out within projects, which are called COST Actions. COST Actions are bottom-up science and technology networks open to researchers and stakeholders, meaning that the topics for which COST Actions can be applied are open and are freely chosen only by the proposing scientists. (COST Office 2013b)

An Action brings together researchers from a minimum of five countries (the average is 20), has a lifetime of four years and an average annual budget of approximately €129,000. Research entities from non-COST countries are allowed to participate in Actions based on the principle of mutual interest and provided they cover their costs of participating out of own funds (except in the case of 'near neighbour' countries whose researchers' participation is funded by COST).

While the individual COST Actions are limited in their budgets, the leverage is considerable. COST has itself calculated that the nationally funded research that is brought together in the Actions is worth a total of €2 billion annually. (Horvat et al. 2010: 20) According to COST Office (2013: 5), COST levers approximately €5 billion of research funding.

4.2 Main Competitors

According to a European Commission report, related to optimisation of research programmes and priorities, in the European Research Area "many transnational networking initiatives are in operation in parallel and other transnational stakeholders (EUREKA,

ERC and ESF) are reconsidering their respective unique position” (Directorate-General for Research 2008:24). Based on this, the particular organisations – EUREKA, ERC and ESF – could be considered as COST main competitors.

Founded in 1985, to challenge the increasing migration of R&D and industrial innovation to Asian and North-American countries, EUREKA now unites 40 member countries and also counts the European Union as its 41st member. Together, they promote international, market-oriented research and innovation through the support they offer to small and medium-sized enterprises, large industry, universities and research institutes. Through EUREKA, these organisations are introducing new products, processes and services to market, helping make Europe economically strong and socially sound. (EUREKA 2013)

The European Research Council (ERC) – the first pan-European funding body for frontier research – was set up in 2007 under FP7. It is aimed at enhancing the dynamic character, creativity and excellence of European research at the frontiers of knowledge. Through peer reviewed competitions the best researchers are funded to perform their research in Europe. The total budget allocated to the ERC for the period 2007 to 2013 is € 7.5 billion. (ERC 2011)

The European Science Foundation (ESF) was established in 1974 to provide a common platform for its Member Organisations to advance European research collaboration and explore new directions for research. It is an independent organisation, owned by 67 Member Organisations, which are research funding organisations, research performing organisations and academies from 29 countries. ESF promotes collaboration in research itself, in funding of research and in science policy activities at the European level. Currently ESF is reducing its research programmes while developing new activities to serve the science community, including peer review and evaluation services. (ESF 2013)

4.3 Present Market Position

According to Arnold & Brown (2009:4), evaluations of the work of COST are consistently positive. In addition, a report conducted by a panel of independent experts from January to May 2010 on behalf of the European Commission concludes that the COST Office proceeds well and recommends the allocation of additional €40 million reserved in FP7 for COST (Horvat et al. 2010:5-6).

Furthermore, several organisations had mentioned COST in their responses to the consultation on the framework related to areas of untapped potential for the development of the European Research Area (ERA), launched by EC from 13 to 30 November 2011. In particular:

Other instruments like COST already allow for cross-border bottom-up programming of research activities, [...] and should be used as instruments instead of creating new instruments or initiatives. (SER 2011:2)

[...] COST, has been proved a very successful mechanism for cross-border operations. It should be developed further and continued in the Horizon 2020⁹. (Tekes 2011:3)

It (COST) is viewed as highly successful at encouraging the development of connections at the EU level, and many UK academics feel that the links developed through COST between early career researchers are valuable and long lasting. (Hale & Yeomans 2011:9)

EU should investigate the possibility of orienting existing instruments dealing with trans-border cooperation, e.g. programme COST, for the purposes of the objectives of the Innovation Union. (MEYS 2011:3)

In consequence, it seems that through the years the role of COST is appreciated by member-countries and scientific organisations giving it a fairly strong market position.

4.4 SWOT Analysis

Market analysis tools can help to understand and identify potential market risks, market scale and segmentation, competitive position, marketing objectives and strategies, etc.

In the current study SWOT Analysis is utilised because it is a useful technique for understanding Strengths and Weaknesses and identifying both the Opportunities and the Threats of an organisation.

Table 3 summarises the SWOT analysis for COST.

⁹ Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. Running from 2014 to 2020 with an €80 billion budget, the EU's new programme for research and innovation is part of the drive to create new growth and jobs in Europe. (European Commission 2013)

Table 3: COST SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> ❖ A bottom-up principle, where applicants from any type of institution can submit an <i>Action</i> proposal in any field of interest at any time of the year ❖ COST produces a leverage effect avoiding duplication of efforts, building joint research efforts, sharing knowledge and ideas and paving the path to innovation ❖ CSO, the COST decision-making body is composed by representatives of the 35 COST Member States (27 EU states, which fund EU, plus 8 neighbouring countries) and one cooperating country. 	<p>Weaknesses</p> <ul style="list-style-type: none"> ❖ Limited ability to develop instrument portfolio outside networking ❖ Lengthy process for submission and evaluation of proposals, it lasts 8 months ❖ Complex COST rules (mainly legal and financial) related to Action management
<p>Opportunities</p> <ul style="list-style-type: none"> ❖ Realise science management synergies with EC and/or other similar nature organisations, e.g. shared database of peers 	<p>Threats</p> <ul style="list-style-type: none"> ❖ COST is vulnerable to uncertainties about future funding from EC ❖ Low participation from the scientific community into COST Actions threatens COST mission ❖ Reduced Member States commitment to COST looms COST existence ❖ Several similar nature organisations that could take over COST activities if they safeguard EC funds

In consequence, it is clear from the above analysis that COST has to be an innovative organisation in order to endure the competition, assure funding by the EC and achieve

long-term success in general. As it was mentioned in previous chapters, job satisfaction is important for innovation, therefore, discovering the relationships of its various aspects with innovation could permit COST to identify and focus on those aspects that will nurture the innovation depending on its needs.

The next chapter describes the instruments that are used to measure the satisfaction with the various job aspects, and the administrative and technological innovation involvement of COST employees, the process that is followed to acquire the information, the demographics of the research participants and designates the statistical methodology that is used for the analysis of the data.

5 Measurement

Measurement is a fundamental activity of science, which allows acquiring knowledge about people, objects, events, and processes by observing them. Making sense of these observations frequently requires that they are quantified, i.e. we measure the things in which we have a scientific interest. Whatever the initial motives are, each area of science develops its own set of measurement procedures. Within the behavioural and social sciences, the measurement procedure used to estimate psychological and social phenomena is the questionnaire. (DeVellis 2003: 2-3)

Accordingly, the empirical research of the current study, which was conducted in the case study organisation that is described in Chapter 4, utilises a Web¹⁰ self-administered¹¹ questionnaire (see also section 1.2.2).

Visser et al. (2000: 243) advise that with self-administered questionnaires, the researcher must be as concerned about the layout of the questionnaire as with the content; that is, the format must be "user-friendly" for the respondent. Following this advice, the questionnaire of the study was encompassed in a single web page in order to provide the respondent with an immediate impression of its size and avoid unnecessary clicks to navigate to subsequent pages. Additionally, the structure of the page has been designed so that the horizontal scrolling, which would pose difficulties in reading the questions and selecting the corresponding responses, was eliminated.

Furthermore, the questionnaire is comprised of four distinctive groups, corresponding to technical innovation, administrative innovation, job satisfaction aspects and general demographic information. According to Visser et al. (2000: 241), once a bit into a questionnaire, grouping questions by topic may be useful because once a respondent starts thinking about a particular topic, it is presumably easier for him or her to continue doing so, rather than having to switch back and forth between topics, question by question.

¹⁰ The website <https://elomake.metropolia.fi> was used.

¹¹ The essence of self-administered surveys is that there is no interviewer to administer the survey, pose the questions, and record the answers. The respondent administers the questionnaire, reads the questions, and records the answers and there is no interviewer to assist or explain. The question-answer process is totally self-administered. (De Leeuw & Hox 2008:239)

In addition, each group contains a short description, either defining the related concept or explaining why it is necessary for the research, followed by a number of questions. The questions have been written in a way that they do not leave the respondent in a dilemma about the answer, with exceptionally lengthy items being avoided, as length usually increases complexity and diminishes clarity (DeVellis 2003: 67).

Moreover, the questions have been ordered so that the respondents have first to answer the items related to innovation, then the items related to job satisfaction and last the demographic items. Visser et al. (2000: 241) note that if a questionnaire begins with questions about matters that are highly sensitive or controversial respondents may become uncomfortable, uninterested, or unmotivated and may therefore terminate their participation. Taking into account that income might be a highly sensitive matter for a respondent and the relation with one's manager a controversial topic and since both items are included in the job satisfaction questions, the job satisfaction group of questions was placed after the innovations, in order to help establish respondents' comfort and motivation to provide high-quality data.

Besides, all the items of the questionnaire are closed-ended¹² questions with ordered choices. In the case of innovation and job satisfaction the choices correspond to a Likert-type scale (ordinal¹³ scale), where each item is presented as a declarative sentence, followed by response options that indicate varying degrees of agreement with the statement. Five possible responses are available, namely "Strongly agree", "Agree", "Neither agree nor disagree", "Disagree" and "Strongly disagree". According to DeVellis (2003: 79), Likert scaling is widely used in instruments measuring opinions, beliefs, and attitudes.

The whole questionnaire is presented in Appendix 1. The next sections describe in detail the followed procedure, the survey respondents and their demographics, the measure scales, and touch upon the data analysis topic.

¹² A closed-ended question requires that the respondent select an answer from a set of choices offered explicitly by the researcher (Visser et al. 2000:238).

¹³ **Ordinal scales** allow things to be arranged in order, based on how much of some concept they possess. In other words, an ordinal scale is a ranking scale. For example, in the case that the research participants are asked to rank things based on preference, the ordinal scale lists the options from most to least preferred, or vice versa. Five objects can be ranked from 1–5 (least preferred to most preferred) or 1–5 (most preferred to least preferred) with no loss of meaning. (Zikmund 2010: 298-299)

5.1 Procedure

This research was conducted within the case study organisation after receiving the agreement of the organisation's Director. To collect data on technological and administrative innovations and facets of job satisfaction the afore-described questionnaire was utilised in an anonymous way. The reason for this choice is to minimise risk for participants who believed that any negative responses could jeopardize their standing within the organisation in question or their relationship to their supervisor.

Initially, the questionnaire was pretested. Visser et al (2000: 241) argue that even the most carefully designed questionnaires sometimes include items that respondents find ambiguous or difficult to comprehend, items that respondents understand perfectly well but interpret differently than the researcher intended and due to these reasons questionnaire pretesting was conducted to detect and repair such problems.

Firstly, an informal method, suggested by Campanelli (2008: 179), was accomplished, where the author played the role of the respondent and answered each question himself. Secondly, a use of an expert took place, which is another pretesting method proposed by Campanelli (2008: 183) since consulting with experts offers good feedback to the original questionnaire designer and can help stimulate the designer's own critical thinking. The expert in the particular case is an English linguist. The author provided the expert with a brief that set out the key aims and objectives of the survey and drew attention to questionnaire design problems and issues on which advice was sought. The brief plus the draft questionnaire were given to the expert with adequate time for the expert to respond. The expert's comments were taken into account and incorporated into the questionnaire.

Afterwards, the main survey invitation was sent to the participants in the form of an email message, which is presented in Appendix 2. As it was agreed with the Director of the case study organisation the sender of the email was the Head of the Human Resources unit of the organisation, although the content of the message had been drafted by the author. The goal of the main survey invitation is to motivate respondents and provide them with necessary information for answering the survey questionnaire (Manfreda & Vehovar 2008: 271).

To minimise the potential for nonresponse¹⁴ error, as it is recommended by Visser et al. (2000: 234), the invitation was informing prospective respondents that they had been selected to participate in a study, explaining that their participation was essential for the study's success, suggesting why the participation was worthwhile, assuring respondents of confidentiality, and informing them of the study's purpose. The item-nonresponse error is eliminated making all the questions of the survey mandatory, i.e. a respondent has to answer all the items in order to successfully submit the questionnaire.

The survey was launched on 8 July 2013 and remained open until 28 August 2013 in order to increase the participation due to absence of potential respondents because of summer holidays. During this period two invitation reminders were sent, on 30 July and 20 August. Initially, the 23 August had been defined as the closing date, however, due to low response rate with the second reminder it was decided to extend the closing date to 28 August.

5.2 Participants

The afore-mentioned main survey invitation was sent to all employees (including managers) of the case study organisation. A total of 58 people received the invitation and 34 of them participated and filled the questionnaire in, i.e. the response rate is 58.6%.

Hager et al. (2003: 257), in their study of response rates for mail surveys of non-profit organisations, observe a return rate for various projects with a median of 52%. Moreover, Jaskyte (2011: 82), in her research of predictors of administrative and technological innovations in non-profit organisations, considers acceptable a mean response rate of 43.5%. In consequence, the response rate of the current study is believed to be satisfactory.

Demographic data were collected in the last part of the questionnaire; participants were asked to report their gender, age range, educational background, tenure within the case study organisation, and whether they hold a managerial post or not. The respondent demographics are provided in Table 4.

¹⁴ Nonresponse is the inability to obtain data for all sampled units on all questions. There are two types of nonresponse in surveys: unit nonresponse and item nonresponse. Unit nonresponse is the failure to obtain any information from an eligible sample unit, i.e. a respondent. Unit nonresponse can be the result of noncontact or refusal. Item-nonresponse or item missing data refers to the failure to obtain information for one or more questions in a survey, given that the other questions are completed. (De Leeuw et al. 2008: 10)

Table 4. Participant demographic information ($N = 34$)

Age (years)		Education*		Tenure	
Range	%	Level	%	Range	%
≤ 29	5.9%	high-school	5.9%	≤ 3 months	11.8%
30 - 39	41.2%	technical	5.9%	4-12 months	23.5%
40 - 49	44.1%	bachelor's	14.7%	1 - 3 years	14.7%
50 - 59	8.8%	graduate	73.5%	3 - 5 years	20.6%
				≥ 5 years	29.4%
Gender					
	%	Post	%		
Female	55.9%	Manager	20.6%		
Male	44.1%	Staff	79.4%		

Notes: *Education: high-school corresponds to a high school certificate or less, technical corresponds to post-high school technical training or degree, bachelor's corresponds to a bachelor's degree and graduate to a graduate degree.

Table 4 demonstrates that 11.76% of the respondents have been for three or less months in the organisation, i.e. they are new employees. Boswell et al. (2009: 851) note that newcomers experience an initial high in job satisfaction (honeymoon effect) within a few months after organisational entry, trending downward by 6 months on the job.

In order to avoid the bias in the job-related attitudes (job satisfaction aspects) of the study participants due to the honeymoon effect, the responses of those who have been in the organisation for three months or less were removed and were not considered in the following statistical analysis.

Table 5. Participant demographic information without newcomers ($N = 30$)

Age (years)		Education*		Tenure	
Range	%	Level	%	Range	%
≤ 29	6.7%	high-school	6.7%	4-12 months	26.7%
30 - 39	43.3%	technical	6.7%	1 - 3 years	16.7%

Age (years)		Education*		Tenure	
Range	%	Level	Range	%	Level
40 - 49	46.7%	bachelor's	16.7%	3 - 5 years	23.3%
50 - 59	3.3%	graduate	70.0%	≥ 5 years	33.3%
Gender					
	%	Post	%		
Female	56.7%	Manager	16.7%		
Male	43.3%	Staff	83.3%		

The demographic information of the resulted sample ($N = 30$) is formed according to Table 5.

5.3 Measures

Measurement instruments that are collections of items combined into a composite score, and intended to reveal levels of theoretical variables not readily observable by direct means, are often referred to as scales (DeVellis 2003: 8-9).

In addition, DeVellis (2003: 14) mentions that:

Typically, researchers are interested in constructs rather than items or scales per se. However, scale items are usually a means to the end of construct assessment. In other words, they are necessary because many constructs cannot be assessed directly. In a sense, measures are proxies for variables that we cannot directly observe. By assessing the relationships between measures, we infer, indirectly, the relationships between constructs.

The following subsections describe the scales that were used in the study in order to measure the technological and administrative innovations and the various facets of job satisfaction.

5.3.1 Technological Innovation

Technological innovation is measured through a set of items that are adopted from the Organizational Innovativeness Questionnaire (Jaskyte 2002; Jaskyte 2011: 82) and the questionnaire defined by Camarero & Garrido (2008: 424). Figure 4 summarises the

items used for the assessment of the employee involvement or will to contribute into technological innovations within the organisation.

Technological Innovation

Technological innovations are directly related to the primary activities of the organisation and produce changes mainly in its operating systems. For example, the implementation of a program, which serves better the clients (end users) and is new to the usual organisational practice.

I have contributed / want to contribute to the ...

* implementation of new services / programs	<input type="radio"/> Strongly agree <input type="radio"/> Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Disagree <input type="radio"/> Strongly disagree
* change of an existing service / program into something new and recognisably different	<input type="radio"/> Strongly agree <input type="radio"/> Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Disagree <input type="radio"/> Strongly disagree
* extension of existing service(s) to new groups of clients (end users) previously not served by the organisation	<input type="radio"/> Strongly agree <input type="radio"/> Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Disagree <input type="radio"/> Strongly disagree
* use of new technologies to assist the clients (end users) or the employees of the organisation	<input type="radio"/> Strongly agree <input type="radio"/> Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Disagree <input type="radio"/> Strongly disagree
* cooperation with other organisations to improve the technology and innovations	<input type="radio"/> Strongly agree <input type="radio"/> Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Disagree <input type="radio"/> Strongly disagree

Figure 4: Technological Innovation Measure

Five items are used to assess the technological innovation, specifically, the implementation of new services or programs, the significant change in already existing services or programs, the extension of services to new groups of clients previously not served by the organisation, the use of new technologies to assist the clients or the employees of the organisation and the cooperation with other organisations to improve the technology and innovations.

5.3.2 Administrative Innovation

Administrative innovation is measured through a set of items that are adopted from the Organizational Innovativeness Questionnaire (Jaskyte 2002; Jaskyte 2011: 82), the questionnaire defined by Camarero & Garrido (2008: 424) and Mak & Akhtar (2003: 513). Figure 5 summarises the items used for the assessment of the employee involvement or will to contribute to administrative innovations within the organisation.

Administrative Innovation					
<p>Administrative innovations are oriented towards the efficiency and effectiveness of organisations' management processes and administrative systems. For example, the implementation of a structure, process, system, policy in the administrative core of the organisation that is new to the usual organisational practice.</p>					
I have contributed / want to contribute to the implementation of a new ...					
	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
* employee performance evaluation system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
* employee incentive / reward system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
* way of recruiting employees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
* organisational structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
* quality management system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 5: Administrative Innovation Measure

Five items are used to assess the administrative innovation, in particular, the implementation of a new employee performance evaluation system, the implementation of a new employee incentive / reward system, the implementation of a new recruitment way, the implementation of a new organisational structure and the implementation of a new quality management system.

5.3.3 Job Satisfaction Facets

Existing measures of job satisfaction can be long and time consuming to administer, for example the JDI (BGSU 2013) contains 72 end-points rating the job satisfaction with specific facets and the Minnesota Satisfaction Questionnaire consists of 100 questions in its full form.

On the other side, Nagy (2002: 83) demonstrates that single-item measures of facet satisfaction compare quite favourably with multiple-item measures of facet satisfaction and Yeoh (2011: 66) shows that single-item measures can predict organization-relevant outcomes just as well as longer measures.

Furthermore, the single-item measure appears to be preferable to multiple-item measures of facet satisfaction in that it is more efficient, is more cost-effective, contains more face validity, and is better able to measure changes in job satisfaction (Nagy 2002: 85).

The next chapter delves into the various statistical analysis techniques – for instance confirmatory factor analysis¹⁵ and multiple regression analysis¹⁶ – that are used by the current research reflecting on the various findings. Statistical analyses for this study are conducted using the software application IBM SPSS Statistics 21 unless otherwise specified.

¹⁵ Factor analysis is a prototypical multivariate, interdependence technique. It is a technique of statistically identifying a reduced number of factors from a larger number of measured variables. The factors themselves are not measured, but instead, they are identified by forming a variate using the measured variables. Factors are usually latent constructs like attitude or satisfaction, or an index like social class. Factor analysis can be divided into two types: exploratory factor analysis (EFA) performed when the researcher is uncertain about how many factors may exist among a set of variables and **confirmatory factor analysis** (CFA) performed when the researcher has strong theoretical expectations about the factor structure (number of factors and which variables relate to each factor) before performing the analysis. (Zikmund et al. 2010: 593)

¹⁶ Simple regression analysis is a technique for measuring the linear association between a continuous, interval-scaled dependent variable and an independent (or predictor) variable, attempting to predict the values of the former from specific values of the latter. Although simple regression and correlation are mathematically equivalent in most respects, regression is a dependence technique where correlation is an interdependence technique. A dependence technique makes a distinction between dependent and independent variables. An interdependence technique does not make this distinction and simply is concerned with how variables relate to one another. **Multiple regression analysis** is an extension of simple regression analysis allowing a dependent variable to be predicted by multiple independent variables. (Zikmund et al. 2010: 564, 584)

6 Results and Discussion

Apart from basic analyses, such as descriptive analysis and bivariate correlations, confirmatory factor analysis and multiple regression analysis were performed on the study variables.

The next sections concentrate on the descriptive statistics of the study, the analysis regarding the reliability and validity of the used scales, the creation of composite scales and, last but not least, the testing of the conceptual model that underlies the study and the relevant hypotheses.

6.1 Descriptive Statistics

Descriptive statistics describe basic characteristics and summarize the data in a straightforward and understandable way (Zikmund et al. 2010: 413).

Certain statistics are most appropriate for different measures. In case of discrete¹⁷ measures, like the ordinal scales that are used in the current study, the median¹⁸ and the mode¹⁹ – but not the mean²⁰ – are recommended by Zikmund et al. (2010: 299, 302), in order to best describe the central tendency.

The median and mode values of the items of technological and administrative innovations, and the job satisfaction facets are presented in Table 6, encompassing the mean values indicatively. For simplicity purposes the five items of technological innovation are labelled TI1, TI2, TI3, TI4 and TI5 and the five items of administrative innovation are labelled AI1, AI2, AI3, AI4 and AI5 (the one to one correspondence to survey items is presented in Appendix 3).

¹⁷ Discrete measures are those that take on only one of a finite number of values. Nominal and ordinal scales are discrete measures (Zikmund et al. 2010: 301).

¹⁸ The median, is the midpoint of the distribution, or the 50th percentile. In other words, the median is the value below which half the values in the sample fall, and above which half of the values fall (Zikmund et al. 2010: 418).

¹⁹ The mode is the measure of central tendency that identifies the value that occurs most often (Zikmund et al. 2010: 418).

²⁰ The mean is simply the arithmetic average, and it is perhaps the most common measure of central tendency (Zikmund et al. 2010: 415).

Table 6. Descriptive Statistics ($N = 30$)

Item	Median	Mode	Mean
T11	4.0	4.0	4.2
T12	4.0	4.0	4.0
T13	4.0	4.0	3.8
T14	4.0	4.0	4.2
T15	4.0	4.0	3.8
A11	4.0	4.0	3.6
A12	4.0	5.0	3.7
A13	3.5	3.0 ^a	3.5
A14	4.0	4.0	3.6
A15	4.0	5.0	4.0
Income	3.0	2.0 ^a	3.3
Advancement	2.0	2.0	2.5
Nature of Work	4.0	4.0	3.8
Supervision	4.0	4.0	3.8
Co-workers	4.0	4.0	4.0
Security	3.0	4.0	3.1

Notes: ^a Multiple modes exist. The smallest value is shown

Table 6 indicates that employees in the case organisation are in general satisfied with the relation with their colleagues and manager and with the nature of their work itself. On the other hand, they are rather dissatisfied with their income and the security that the job offers them and dissatisfied with the opportunities they have for advancement.

Figure 7 illustrates the differences between the genders among the various job satisfaction facets proportionally to the total amount of answers per gender.

Both genders are satisfied with the relations with their colleagues but it seems that female employees are more satisfied with the relations they have with their managers than their male workmates.

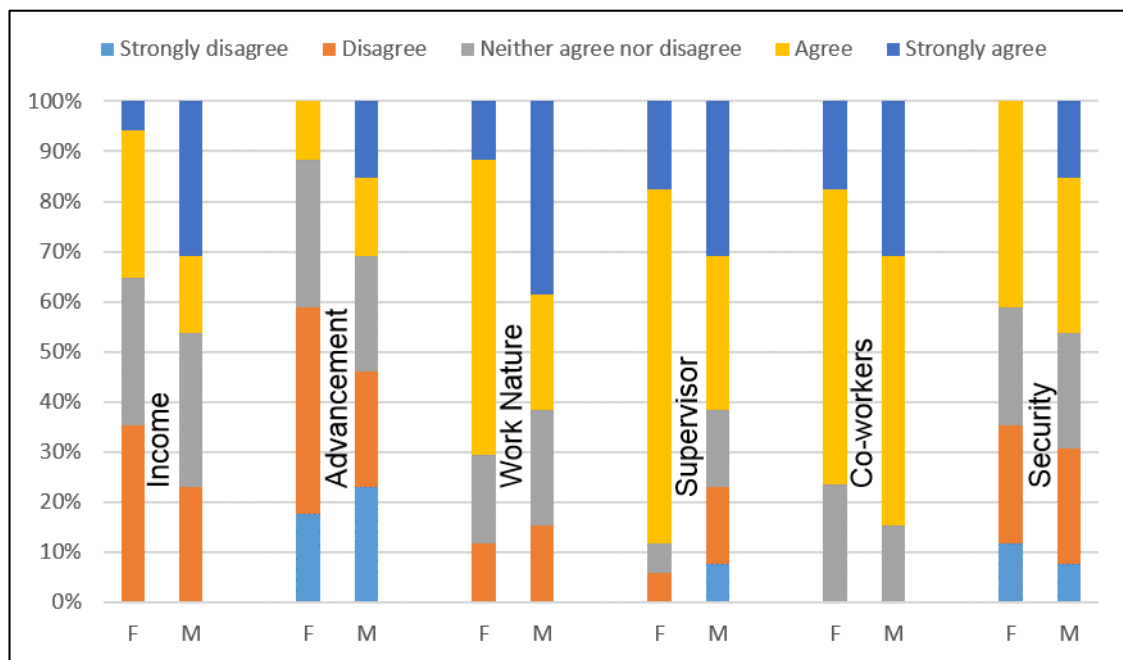


Figure 7: Gender and Job Satisfaction Facets (F = Female, M = Male)

In addition, Figure 8 depicts the job satisfaction of the employees relatively to the years of employment in the case organisation.

The most satisfied with their income are the relative newcomers and on the opposite side those who have been three or more years in the organisation. As it was mentioned before and regardless of the years of tenure, employees are in general dissatisfied with the opportunities for advancement, with those who have been for more than five years showing the biggest degree of dissatisfaction. It should be noted that relative newcomers and the employees who have been with the organisations for more than five years are similarly dissatisfied with the job security aspect.

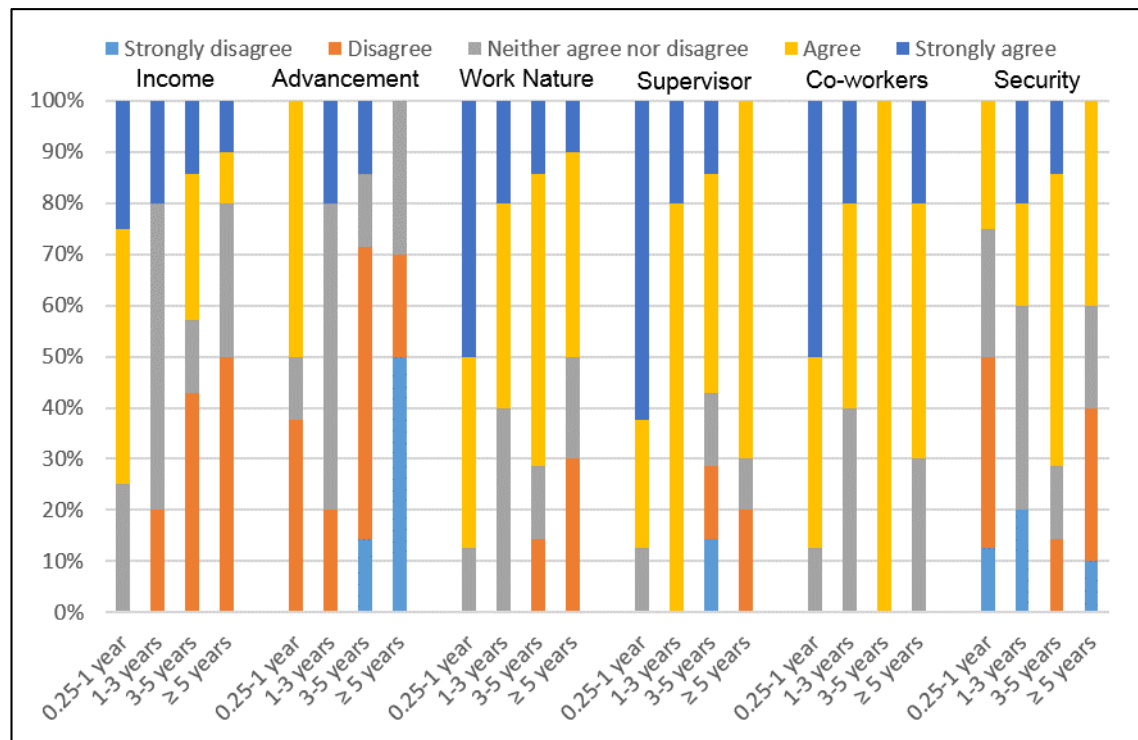


Figure 8: Tenure and Job Satisfaction Facets

Furthermore, based on Table 6, employees have generally contributed or willing to contribute towards all mentioned aspects of technological and administrative innovation, with the exception of AI3 variable, which corresponds to the way of recruiting employees, to which they are rather indifferent. It is interesting to note the value of the mode in the case of AI2 (employee incentive / reward system) and AI5 (quality management system), which is 5. None of the particular aspects is fully implemented in the organisation in question and perhaps employees strongly identify the need for both of them with their will to contribute to their implementation.

6.2 Reliability

Reliability is an indicator of a measure's internal consistency. Consistency is the key to understanding reliability. A measure is reliable when different attempts at measuring something converge on the same result. (Zikmund et al. 2010: 305).

Reliability has two meanings; first, a given respondent whose value on a construct has not changed should give the same answer to the same question at different points in time. In a parallel way, two respondents whose true value on a construct is the same should answer the question in the same way. To the extent that there is inconsistency,

the measurement is to some degree unreliable; that is, it does not always give the same result when the true value is the same. (Fowler & Cosenza 2008: 137)

There are several methods for computing reliability, however, here the internal consistency reliability is used, which is concerned with the uniformity of the items within a scale; a scale is internally consistent to the extent that its items are highly inter-correlated (DeVellis 2003: 28).

Coefficient alpha²¹ (α) is the most commonly applied estimate of a multiple-item scale's reliability (DeVellis 2003: 28; Zikmund et al. 2010: 306). DeVellis (2003: 95-96) proposes the following ranges for research scales: $\alpha < 0.60$ unacceptable, $0.60 \leq \alpha \leq 0.65$ undesirable, $0.65 < \alpha \leq 0.70$ minimally acceptable, $0.70 < \alpha \leq 0.80$ respectable and $0.80 < \alpha \leq 0.90$ very good.

Nevertheless, when a scale consists of a single item, DeVellis (2003: 96) points that it is impossible to use alpha as the index of reliability. Therefore, in the two following subsections only the reliability of the technological and administrative innovation scales is assessed.

6.2.1 Technological Innovation

The technological innovation is measured in the afore-described questionnaire with five variables, namely TI1, TI2, TI3, TI4 and TI5. The items in question achieve a reliability of coefficient alpha equal to **0.47**, which according to the previous discussion is considered unacceptable since the scale has poor reliability.

Delving into the inter-item correlation matrix results, which are demonstrated in Table 7, it is apparent that the inter-correlation of TI5 (contribution or will to contribute to cooperation with other organisations to improve the technology and innovations) with the other items of the scale is either negative or very low, although they are supposed to be positively related since they are measuring the same construct. This suggests that TI5 does not measure the same phenomenon as the other items.

²¹ Coefficient α represents internal consistency by computing the average of all possible split-half reliabilities for a multiple-item scale. The coefficient demonstrates whether or not the different items converge. Coefficient alpha ranges in value from 0, meaning no consistency, to 1, meaning complete consistency (all items yield corresponding values). (Zikmund et al. 2010: 306)

Table 7. Technological Innovation's Inter-Item Correlation Matrix and Item-Total Statistics

	T11	T12	T13	T14	T15	Corrected Item-Total Correlation	α if Item Deleted
T11	1.00					0.31	0.36
T12	0.45	1.00				0.34	0.35
T13	0.21	0.32	1.00			0.33	0.35
T14	0.34	0.15	0.22	1.00		0.37	0.34
T15	-0.17	-0.12	0.05	0.15	1.00	-0.04	0.60

According to DeVellis (2003: 93), any item that is positively correlated with some and negatively correlated with others in a homogeneous set should be eliminated. In addition, examining the corrected item-total correlation column in Table 7, which correlates the item being evaluated with all the scale items, excluding itself, it is noticeable that the value for T15 is negative, close to 0. DeVellis (2003: 93) notes that an item with a high value for this correlation is more desirable than an item with a low value.

Last but not least, the “ α if Item Deleted” column of Table 7 indicates that if the item T15 is deleted, then the coefficient alpha based on the remaining items will be 0.60, which exceeds the initial estimate of reliability of 0.47. In consequence, eliminating variable T15 from the technological innovation scale a reliability of alpha equal to **0.60** is achieved. Although DeVellis (2003: 95-96) considers this value undesirable, on the other hand, Zikmund et al. (2010: 306) mention that an α value between 0.60 and 0.70 indicates fair reliability. In addition, in the study of Jaskyte (2011: 83) an internal consistency reliability of 0.54 is reported for the technological innovation scale.

In consequence, the achieved reliability of 0.60 is considered acceptable and the variable T15 is not going to be taken into account for the rest of the study.

6.2.2 Administrative Innovation

The administrative innovation is measured in the afore-described questionnaire with five variables, namely AI1, AI2, AI3, AI4 and AI5. The items in question achieve a reliability of coefficient alpha equal to **0.93**, i.e. the administrative innovation scale is considered to have very good reliability.

6.3 Validity

Apart from being consistent, i.e. reliable, good measures should also be accurate. Accuracy deals more with how a measure assesses the intended concept (construct). Validity is the accuracy of a measure or the extent to which a score truthfully represents a concept (construct). A measure can be reliable, but not valid. However, a valid measure is reliable. (Zikmund et al. 2010: 307, 310)

According to DeVellis (2003: 49), there are essentially three approaches to establishing validity, namely: content²² validity, criterion²³ validity and construct validity. As it was mentioned in sections 5.3.1 and 5.3.2, the items of the technological and administrative innovation scales of the current study originate from already established measures of the two innovations. Thus, it is assumed that the content and criterion validities are fulfilled by the scales of the study, focusing instead, in the next paragraphs, on construct validity. Moreover, since the items associated to the job satisfaction facets convey the concept related to the facet, these single-item scales are assumed to be valid in the context of the current study.

Construct validity exists when a scale reliably measures and truthfully represents a unique concept (construct). Factor analysis can be useful in establishing construct validity; especially confirmatory factor analysis (CFA) is a good tool because it provides a test of how well the researcher's "theory" about the factor structure fits the actual observations. (Zikmund et al. 2010: 308-309, 593)

Based on the above discussion (see sections 6.2.1 and 6.2.2), it is hypothesised that the technological innovation construct is measured with four observed variables, namely TI1, TI2, TI3 and TI4, and the administrative innovation is measured with five, AI1, AI2, AI3 AI4 and AI5. It is also assumed that there is no significant correlation between the two

²² The degree to which a measure covers the breadth of the domain of interest (Zikmund et al. 2010: 307).

²³ The ability of a measure to correlate with other standard measures of similar constructs or established criteria (Zikmund et al. 2010: 308).

constructs, in order to exclude discriminant²⁴ validity. Figure 9 depicts the graphical representation of the hypothesized CFA model that is to be tested to see how well it fits the observed data.

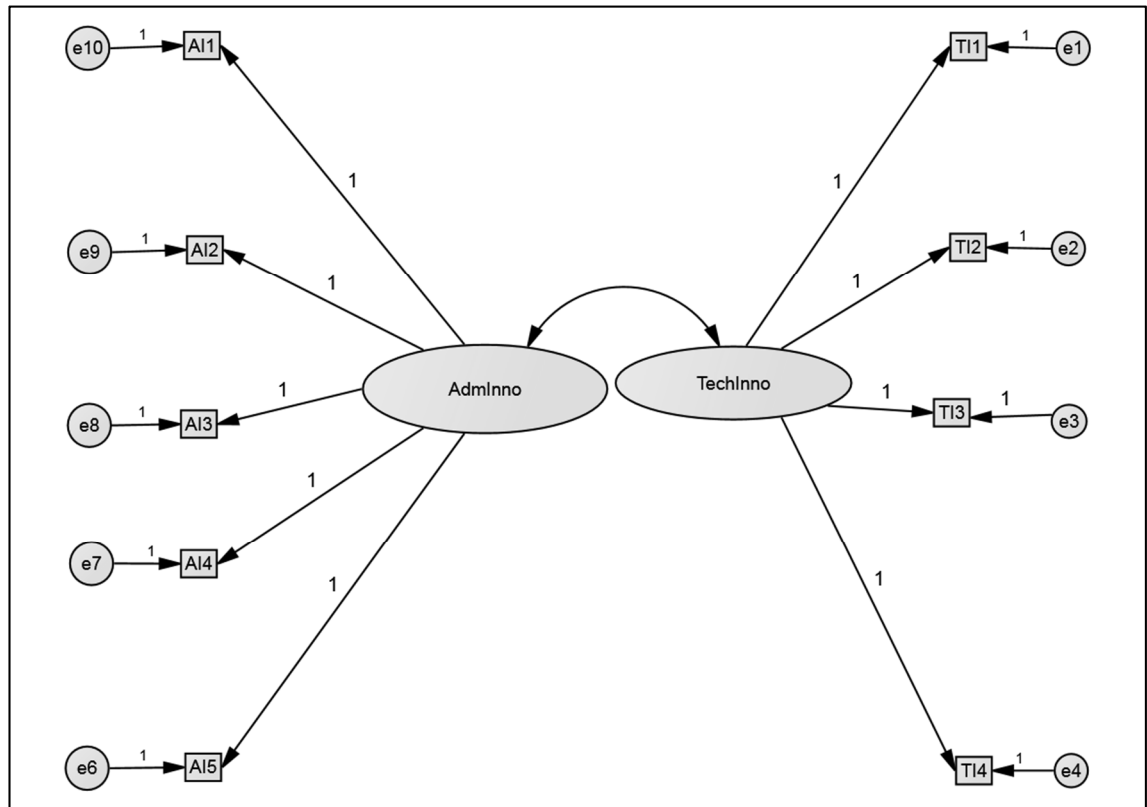


Figure 9: Hypothesized Model for Confirmatory Factor Analysis

The numbers “1” in the diagram (see Figure 9) indicate that the regression coefficient has been fixed to 1. Coefficients are fixed to a number to minimize the number of parameters estimated in the model (Schreiber et al. 2006: 324). The variables e1 to e10 of the diagram represent any and all influences on the corresponding pointing item – T1 to T4 and A1 to A5 – that are not shown elsewhere in the diagram. For instance, e1 represents error of measurement in TI1, but also any other characteristic that might affect scores on TI1 but that does not appear elsewhere in the model (Arbuckle 2012: 139).

The software application IBM SPSS AMOS 21 is used in order to perform the confirmatory factor analysis and get a measure of fit of the data to the afore-described model. Figure 10 illustrates the model in question (*CFA-Model 1*), with the factor loadings being

²⁴ Represents how unique or distinct is a measure; a scale should not correlate too highly with a measure of a different construct (Zikmund et al. 2010: 308).

represented by the numbers on the side of the arrows connecting the factor (construct, i.e. Technological and Administrative Innovations) with the variables (items).

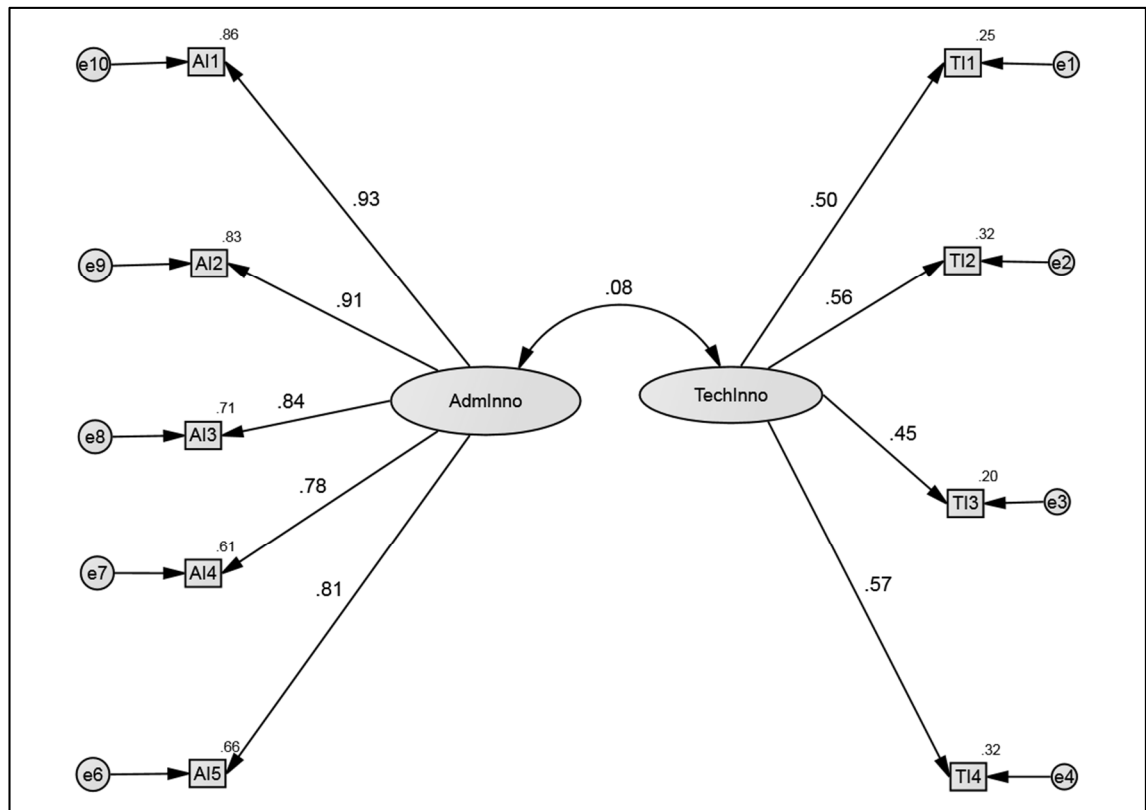


Figure 10: Factor Loading Estimates – 5 Administrative and 4 Technological Innovation Items (CFA-Model 1)

A factor loading indicates how strongly a measured variable is correlated with the particular factor, i.e. to what extent the variable “loads” on the factor (Zikmund et al. 2010: 594). DeVellis (2003: 135) indicates **0.50** as cut off value for factor loadings. The diagram of Figure 10 reveals that the factor loading of item TI3 – contributions and/or will to contribute to extension of existing service(s) to new groups of clients (end users) previously not served by the organisation – is 0.45.

Taking into account that the customer audience of the study organisation is limited by its constitutional rules to the researchers of the member countries, the potential extension of existing services to new groups of clients is practically difficult. In consequence, the low correlation of the particular item with the Technological Innovation factor for the survey participants is understandable. In consequence, before we proceed further with the examination of the fit of the hypothesised model to the observed data, the variable TI3 is eliminated from the model and is not going to be taken into account for the rest of the

study. The resulted model (*CFA-Model 2*) with the corresponding estimated factor loadings is portrayed by the diagram of Figure 11.

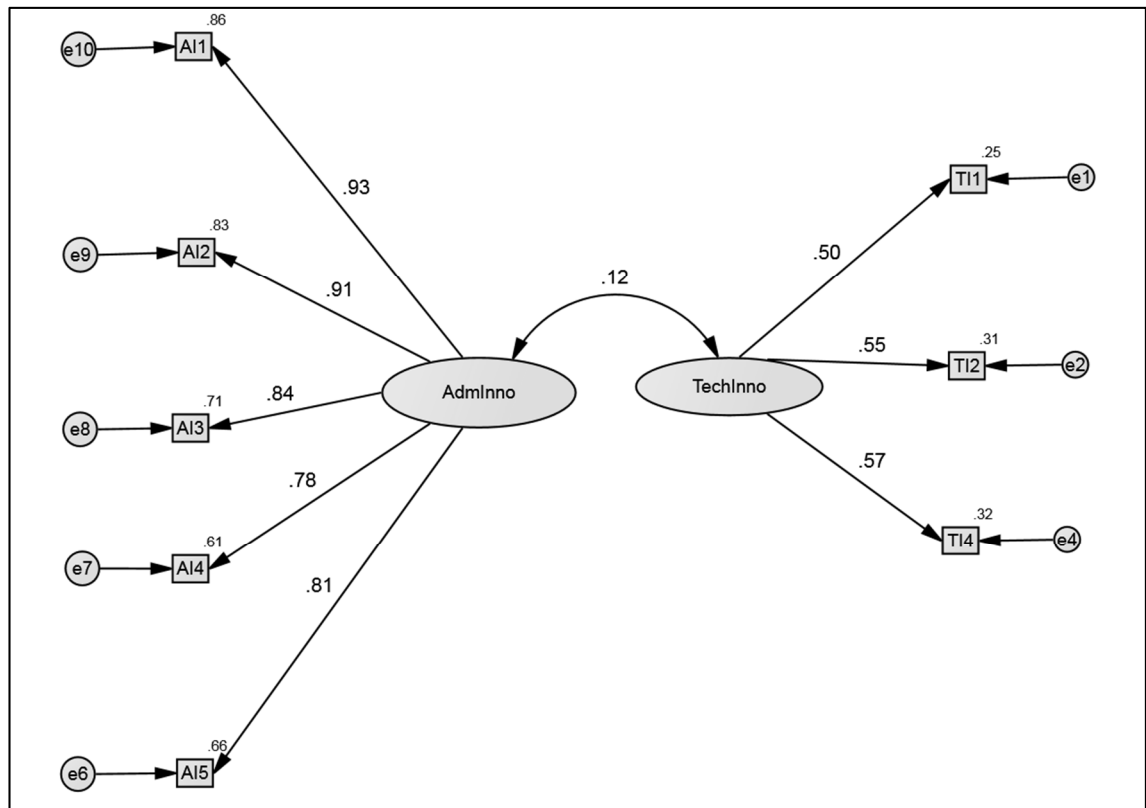


Figure 11: Factor Loading Estimates – 5 Administrative and 3 Technological Innovation Items (*CFA-Model 2*)

Schreiber et al. (2006: 327) report that in reference to model fit, researchers use numerous goodness-of-fit indicators to assess a model, for instance, some common fit indexes are the Normed Fit Index (NFI²⁵), Non-Normed Fit Index (NNFI²⁶, also known as TLI²⁶), Incremental Fit Index (IFI), Comparative Fit Index (CFI²⁷), and Root Mean Square Error

²⁵ NFI assesses the model by comparing the χ^2 value of the model to the χ^2 of the null model. The null / independence model is the worst case scenario as it specifies that all measured variables are uncorrelated. Values for this statistic range between 0 and 1. More recent suggestions state that the cut-off criteria should be $NFI \geq .95$. (Hooper et al. 2008: 55)

²⁶ NNFI (TLI) rectifies the major drawback of NFI, which is sensitive to sample size underestimating fit for samples less than 200. TLI is an index that prefers simpler models. NNFI (TLI) ≥ 0.95 is suggested as the threshold. (Hooper et al. 2008: 55)

²⁷ CFI is a revised form of the NFI which takes into account sample size and performs well even when sample size is small. Like the NFI, this statistic assumes that all latent variables are uncorrelated (null/independence model) and compares the sample covariance matrix with this null model. As with the NFI, values for this statistic range between 0.0 and 1.0 with values closer to 1.0 indicating good fit. A value of $CFI \geq 0.95$ is presently recognised as indicative of good fit. CFI

of Approximation (RMSEA²⁸); they specify as preferable indicators the **TLI**, **CFI** and **RMSEA**. These indexes together with the relative / normed chi-square²⁹ (χ^2 / df) are going to be examined in order to conclude about the fit of the various models and in consequence the validity of the two innovation constructs.

Table 8 summarises the fit indexes cut-off levels for determining model fit. In general, if the vast majority of the indexes point out to a good fit, then there is probably a good fit (Schreiber et al. 2006: 327).

Table 8. Cut-off Criteria for Several Fit Indexes (Schreiber et al. 2006: 330; Hooper et al. 2008: 53-54)

General rule for acceptable fit	<i>CFA-Model 2</i>	<i>CFA-Model 3</i>	<i>CFA-Model 4</i>
$\chi^2 / df \leq 2$	1.628	1.031	1.077
CFI \geq 0.95	0.878	0.994	0.986
TLI \geq 0.95	0.863	0.993	0.983
RMSEA < 0.060	0.145	0.032	0.051

The values of the afore-mentioned indexes of *CFA-Model 2* are included in Table 8. It is clear that the majority of the values does not meet the cut-off criteria, thus various modifications of the model have to be considered. IBM SPSS AMOS 21 offers a feature that is named Modification Indices, which allows to evaluate potential modifications providing suggestions for model alterations that are likely to compensate with smaller chi-square values (Arbuckle 2012: 105). Table 9 contains the modification indices for *CFA-Model 2*.

is one of the most popularly reported fit indices due to being one of the measures least effected by sample size. (Hooper et al. 2008: 55)

²⁸ RMSEA tells us how well the model, with unknown but optimally chosen parameter estimates would fit the populations' covariance matrix. In recent years it has become regarded as 'one of the most informative fit indices due to its sensitivity to the number of estimated parameters in the model. Recently, a cut-off value close to .06 or a stringent upper limit of 0.07 seems to be the general consensus amongst authorities in this area. (Hooper et al. 2008: 54)

²⁹ The Chi-Square value is the traditional measure for evaluating overall model fit and, 'assesses the magnitude of discrepancy between the sample and fitted covariances matrices. When small samples are used, the Chi-Square statistic lacks power and because of this may not discriminate between good fitting models and poor fitting models. One example of a statistic that minimises the impact of sample size on the Model Chi-Square is the relative/normed chi-square χ^2 / df . (Hooper et al. 2008: 53-54)

Table 9. *CFA-Model 2* Modification Indices: Covariances

	Modification Index³⁰	Par Change³¹
e9 <--> e10	6.557	.113
e7 <--> e10	7.509	-.206
e7 <--> e8	6.158	.266
e6 <--> Admlnno	5.482	-.342
e6 <--> e7	5.545	.280

Based on Table 9, the largest modification index is selected, i.e. 7.509, and the *CFA-Model 2* is modified so that the correlation of the error variables e7 and e10 is allowed. The values of the afore-described fit indexes for the resulting model (*CFA-Model 3*) are summarised in Table 8, where it is clear that all of them satisfy the rules for acceptable model fit.

Westfall et al. (2012) report that correlated error terms may also be a consequence of acquiescence. Acquiescence bias refers to a respondent's tendency to agree with items, irrespective of their content (DeVellis 2003: 69). The two above-mentioned correlated error variables e7 and e10 correspond to the administrative innovation items AI4 (the respondent has contributed and/or wants to contribute to the implementation of a new organisational structure) and AI1 (the respondent has contributed and/or wants to contribute to the implementation of a new employee performance evaluation system).

It is worth mentioning here that a new organisational structure had been put in place in the case study organisation few months before the launch of the survey. Hence, when survey respondents faced AI4 item in the related questionnaire they might have inclined to agree regardless of their real contribution in the topic just because it is already applied.

Therefore, in order to avoid the potential acquiescence bias the item AI4 is deleted from *CFA-Model 3* and it is not going to be considered as a measurement of administrative

³⁰ Modification Index is a conservative estimate of the decrease in chi-square that will occur if two variables, for example e7 and e8 in Table 9, are allowed to be correlated (Arbuckle 2012: 106).

³¹ The column labelled Par Change gives approximate estimates of how much each parameter would change if it were estimated rather than fixed at 0 (Arbuckle 2012: 106).

innovation further in the study. The arisen model, *CFA-Model 4*, is illustrated in Figure 12, including the factor loading estimates. The associated fit model indexes are included in Table 8 meeting the model acceptance rules.

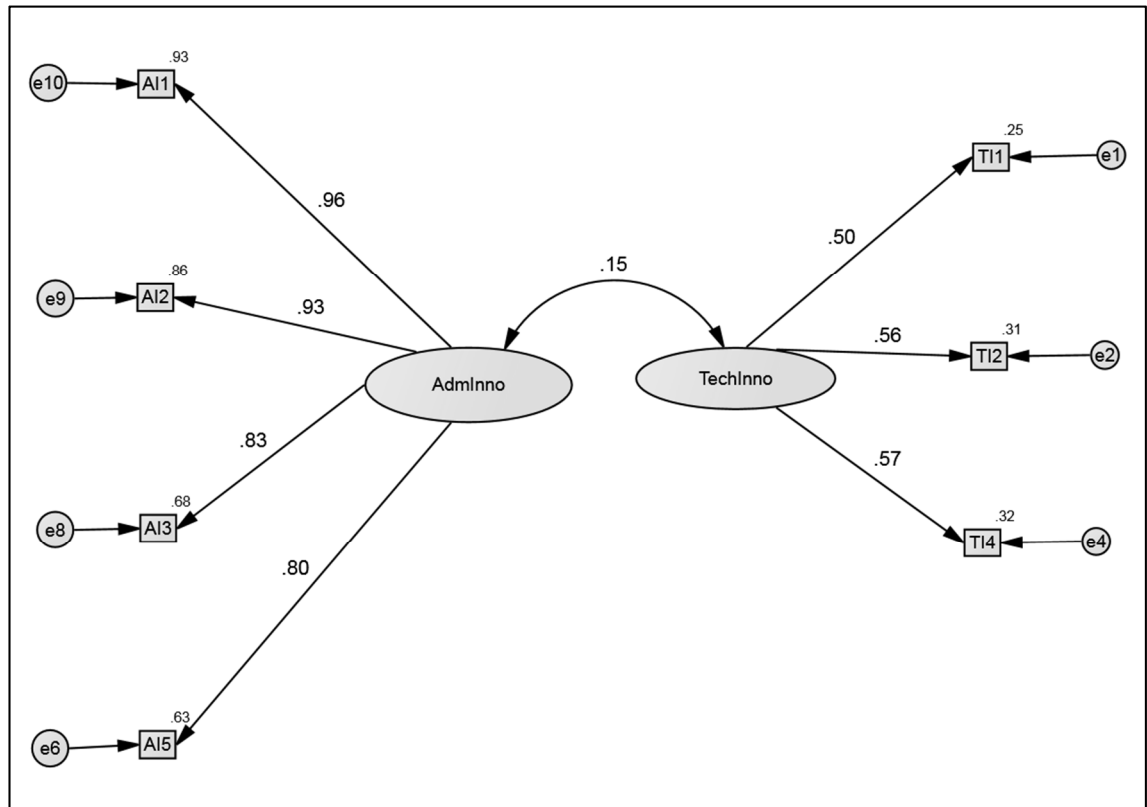


Figure 12: Factor Loading Estimates – 4 Administrative and 3 Technological Innovation Items (*CFA-Model 4*)

In consequence, from the above confirmatory factor analysis, the validity of the scales measuring the Technological and Administrative Innovations is confirmed, including the items T11, T12 and T14, and AI1, AI2, AI3 and AI5 respectively.

Furthermore, the correlation among the two constructs is low enough (0.15) not to raise discriminant validity concerns. In addition, the coefficient alpha of the particular scales is estimated at 0.58 and 0.92 accordingly. These values are within the acceptable limits of scale reliability, based on the above discussion (see sections 6.2.1 and 6.2.2).

6.4 Composite Scales

A common practice among researchers is to summarise information from many items into a reduced set of composite variables. This is called data reduction and is advantageous

because an explanation involving fewer components is better than one involving more. Data reduction is also a way of identifying which variables among a large set might be important in some analysis, simplifying decision making. However, only a set of items that demonstrates good reliability and validity should be used and although not necessary, it is often wiser to divide the summated scale by the number of items so the scale resulting from the data reduction technique is the same as the original items. (Zikmund et al. 2010: 320, 595-596)

Taking into account the data reduction technique and the above reliability and validity discussion and conclusions about the technological and administrative innovation scale items, it was decided to create two composite scales, TI for technological and AI for administrative innovation, where: $TI = \frac{TI1+TI2+TI4}{3}$ and $AI = \frac{AI1+AI2+AI3+AI5}{4}$. The results provide two composite scores on the 1 – 5 scale.

6.5 Hypotheses Testing

Hypotheses are tested by comparing the researcher's accomplished assumptions with empirical results. The process encompasses three major stages: first, the hypotheses are stated as specifically as possible; second, a sample is acquired and the relevant variables are measured; and third, the measured sample-values are compared to the values either stated explicitly or implied by the hypotheses; only if the values are consistent with the hypotheses, the hypotheses are supported. Empirical results testing, typically, involves inferential statistics, which means that an interpretation will be drawn about some population based on observations of a sample representing that population. (Zikmund 2010: 509)

Since stages one and two have been covered earlier in the study, this section focuses on the third stage, testing the conceptual model (see section 3.4) of how administrative and technological innovations relate to various job satisfaction facets.

6.5.1 Correlation

The most popular technique for indicating the relationship of one variable to another is correlation, measuring the association between two variables, i.e. the extent to which a change in one variable corresponds systematically to a change in another. The correlation coefficient, r , ranges from -1.0 to +1.0, indicating both the magnitude of the linear

relationship and the direction of that relationship, positive or negative. (Zikmund 2010: 559)

Table 10. Correlation Matrix³² ($N = 30$)

	1	2	3	4	5	6	7	8
1. Income	--							
2. Advancement	0.43**	--						
3. Nature of work	0.16	0.48**	--					
4. Supervision	0.17	0.60**	0.56**	--				
5. Co-workers	0.04	0.24	0.28	0.26	--			
6. Security	0.01	0.44**	0.29	0.22	0.09	--		
7. Administrative Innovation	0.45**	0.31*	-0.03	0.00	-0.30*	0.00	--	
8. Technological Innovation	0.26	0.48**	0.25	0.18	0.25	0.24	0.07	--
Mean	3.27	2.53	3.77	3.83	4.03	3.07	3.70	4.14
StD	1.08	1.17	0.97	1.02	0.67	1.14	1.03	0.52

** Correlation is significant at the 0.01 level ($p < 0.01$)

* Correlation is significant at the 0.05 level ($p < 0.05$)

Table 10 shows the correlations among the study variables. Rows 7 and 8 of the table show the bivariate relationships between administrative and technological innovations (dependent variables) and each of the job satisfaction facets (independent variables).

There is a strong relationship of administrative innovation with income and opportunities for advancement (row 7, column 1, $r = 0.45$, $p < 0.01$ and row 7, column 2, $r = 0.31$, $p < 0.05$), indicating that employees who are satisfied with their income or the opportunities for advancement have contributed or are willing to contribute to the implementation of topics related to administrative innovation in the work environment.

³² A correlation matrix is the standard form for reporting observed correlations among multiple variables. Although any number of variables can be displayed in a correlation matrix, each entry represents the bivariate relationship between a pair of variables. (Zikmund 2010:562)

On the other side, there is a strong negative relation of administrative innovation with relations with co-workers (row 7, column 5, $r = -0.30$, $p < 0.05$) signifying that employees who are related to the implementation of administrative innovations do not have very good relationship with their workmates. This is comprehensible, taking into account the definition of the administrative innovation given in section 2.2.2.1 – administrative innovation focuses on the efficiency and effectiveness of the organisation's management processes and administrative systems, implementing structures, processes, systems, or policies in the administrative core of the organisation that is new to the usual organisational practice. For example, the implementation of a new performance evaluation system with stricter objectives and rewards might be perceived negatively by the employees and in consequence their relationship with those who have contributed and support its implementation might be disturbed.

Furthermore, there is a strong relationship of technological innovation with opportunities for advancement (row 8, column 2, $r = 0.48$, $p < 0.01$) indicating that employees who are satisfied with the opportunities for advancement have been involved with or are willing to contribute to the implementation of topics related to technological innovation in the work environment. There are also consistently rather strong positive correlations between technological innovation and the remaining job satisfaction aspects, however, these are not statistically significant, for instance: column 1, $p < 0.1$; column 3, $p < 0.1$; column 4, $p < 0.2$; column 5, $p < 0.1$; column 6; $p < 0.2$).

Nevertheless, interpreting the above-described relationships is not simple, because, as Table 10 demonstrates, there are many strong correlations. Testing the conceptual model means that it is necessary to tease out these relationships (Easterby-Smith et al. 2010: 289). This is the purpose of statistical analysis and since the current study requires the testing of hypotheses and model involving multiple variables, the multivariate statistical analysis is applied. The choice of the multivariate technique that is appropriate for each study is determined by the type of the measurement scales (Zikmund et al. 2010: 583).

6.5.2 Multiple Linear Regression

Based on the nature of the study, the use of multiple linear regression technique to analyse the data is best suited to the current research according to Zikmund et al. (2010: 583), because the dependent variables are measured on a continuous scale (see section 6.4) and the independent variables correspond to ordinal scales (see Chapter 5).

To test the research hypothesis, a model (*Model 1*) that contains all independent variables (job satisfaction facets) has been constructed. Table 11 summarises the results of the regression of administrative and technological innovation on job satisfaction facets, incorporating the standardised regression coefficients³³, the R-squared³⁴ (R^2) and the Adjusted R^2 , and indicating the statistical significance of each model at the R-squared row (when a model is significant it explains a significant portion of the total variation in the dependent variable), and the statistical significance of each coefficient.

Table 11. Regression Analysis of Administrative and Technological Innovations ($N = 30$)

Variable	Administrative Innovation	Technological Innovation
	<i>Model 1</i>	<i>Model 1</i>
Income	0.31	0.07
Supervision	-0.16	-0.22
Co-workers	-0.34	0.17
Advancement	0.44	0.49
Nature of work	-0.07	0.07
Security	-0.11	0.03
R^2	0.38	0.28
Adjusted R^2	0.22	0.09
Std. Error	0.91	0.49

* Statistical significance at the 0.05 level ($p < 0.05$)

Although, income, co-workers and advancement have high coefficient values for administrative innovation and advancement has for technological innovation, nonetheless, none of them is statistically significant and in addition, *Model 1* overall is not significant

³³ Standardised regression coefficient is the estimated coefficient indicating the strength of relationship between an independent variable and a dependent variable expressed on a standardized scale where higher absolute values indicate stronger relationships (range is from -1 to 1). (Zikmund et al. 2010: 658)

³⁴ The coefficient of multiple determination in multiple regression indicates the percentage of variation in Y explained by the combination of all independent variables. For example, a value of $R^2 = 0.845$ means that 84.5 percent of the variance in the dependent variable is explained by the independent variables. (Zikmund et al. 2010: 586)

neither for Administrative nor for Technological Innovation, having $p = 0.07$ and $p = 0.22$ respectively. Zikmund et al. (2010: 588) note that if the test result is not significant then the model should be dismissed.

Considering the insignificance of *Model 1*, alternative models are investigated. In order to scrutinise further the relation of job satisfaction facets with the two innovations it is worth considering the conceptual difference of the job satisfaction facets. Weis (2002: 188) states:

[...] job satisfaction facets can be reliably judged in terms of the concreteness or abstractness of the object being evaluated. Concrete objects refer to objects that can be characterized as "real" in the sense that they have more than conceptual existence. Examples of such objects in the work environment would include co-workers or supervisors. Abstract objects refer to objects that are more conceptual and less tangible. Examples in the work environment would include career opportunities or affirmative action. [...] the concreteness/abstractness of the object and the accessibility of the attitude both predict the extent to which the evaluations of the object are influenced by transient mood states. That is, measures of satisfaction with concrete and highly accessible objects are less influenced by transient mood at the time of attitude measurement than are measures of satisfaction with abstract objects.

Hence, in view of possible bias due to momentary mood of the survey participants, a hierarchical model (*Model 2*) is constructed which is divided into two blocks: the first block contains only the concrete objects of job satisfaction, such as: income, supervision and co-workers, which are entered in the equation first altogether, and the second block contains the remaining variables, which are entered into the analysis at a second step in a stepwise³⁵ mode with the aim of identifying the best model fit.

Table 12 summarises the results of the hierarchical regression of administrative and technological innovation on job satisfaction facets. Although there are interrelations among the independent variables, multicollinearity³⁶ is not an issue since all the VIF values are significantly less than 5.

³⁵ At each step, the independent variable not in the equation that has the smallest probability is entered, if that probability is sufficiently small and variables already in the regression equation are removed if their probability becomes sufficiently large. (IBM 2012: 99)

³⁶ Multicollinearity in regression analysis refers to how strongly interrelated the independent variables in a model are. When multicollinearity is too high, the individual parameter estimates become difficult to interpret. Most regression programs can compute variance inflation factors (VIF) for each variable. As a rule of thumb, VIF above 5.0 suggests problems with multicollinearity. (Zikmund et al. 2010: 588)

Table 12. Hierarchical Regression Analysis of Administrative and Technological Innovations ($N = 30$)

Variable	Administrative Innovation	Technological Innovation
	<i>Model 2 (A)</i>	<i>Model 2 (B)</i>
Income	0.46*	0.06
Supervision	0.01	-0.19
Co-workers	-0.32*	0.17
Advancement		0.53*
Nature of work		
Security		
R^2	0.30*	0.28*
Adjusted R^2	0.22*	0.16*
Std. Error	0.91	0.47

* Statistical significance at the 0.05 level ($p < 0.05$)

The hierarchical regression results in two different models for the two types of innovation. *Model 2 (A)*, comprising the concrete entities of job satisfaction facets, is significant for administrative innovation, having two variables as significant predictors, in particular income and co-workers. On the other side, the model which is significant for technological innovation contains four variables, having one variable as significant predictor, in particular advancement.

Consequently, the results show that the independent variables taken together explain the two types of innovation differently. The percentage of variation in administrative and technological innovations explained by their relationship to independent variables for the two afore-described significant models is 30% and 28%, respectively, based on R^2 values.

Nevertheless, Knofczynski & Mundfrom (2008: 431) suggest that when using multiple regression for prediction purposes the issue of minimum required sample size needs to be addressed in order to ensure a desired amount of accuracy. They state that the minimum required sample size (N) appears to have a relationship with the squared multiple

correlation coefficients and they recommend a sample size of 950 samples for excellent prediction level in case of squared multiple correlation coefficient of 0.25 and seven predictor variables and 600 samples in case of 0.30 and five predictor variables (Knofczynski & Mundfrom 2008: 436, 438).

In the present research there are six predictor variables (job satisfaction facets) and as it was displayed in Table 11 and Table 12 above, the minimum R^2 among the various models is 0.28, hence a sample size N satisfying the condition $600 < N < 950$ would be required taking into consideration the suggestions of Knofczynski & Mundfrom (2008). However the sample size of the current study is only 30, significantly smaller than the lower limit of N . Thus, the small sample size of the study might be the cause of the afore-described model problems.

6.5.2.1 Automatic Linear Modelling

The small sample size issue could be potentially overcome utilising the “Automatic Linear Modelling” feature of IBM SPSS Statistics 21. Among the options of the feature in question is the generation of a sequence of models, each of which is built on the entire dataset, in order to obtain more accurate predictions (IBM 2012: 80).

All independent variables (job satisfaction facets) are inserted into the “Automatic Linear Modelling” in order to form the base model. The number of component models to build automatically is defined so that the total number of finally included items within these models is close to the upper limit of the recommended sample size mentioned above, i.e. 950.

The results of the execution of the automatic tests are summarised in Figure 13, where the predictor variables for Administrative and Technological Innovations are depicted together with their relative importance in estimating the model. Predictor importance does not relate to model accuracy; it just relates to the importance of each predictor in making a prediction, not whether or not the prediction is accurate (IBM 2012: 88).

Comparing the two statistically significant models identified earlier (*Model 2*) and the new models (*Model 3*) it is interesting to note that all the predictor variables (significant and not) that are present in *Model 2* – with the exception of Supervision in the case of Administrative Innovation, having though an almost zero regression coefficient – are also present respectively in *Model 3*.

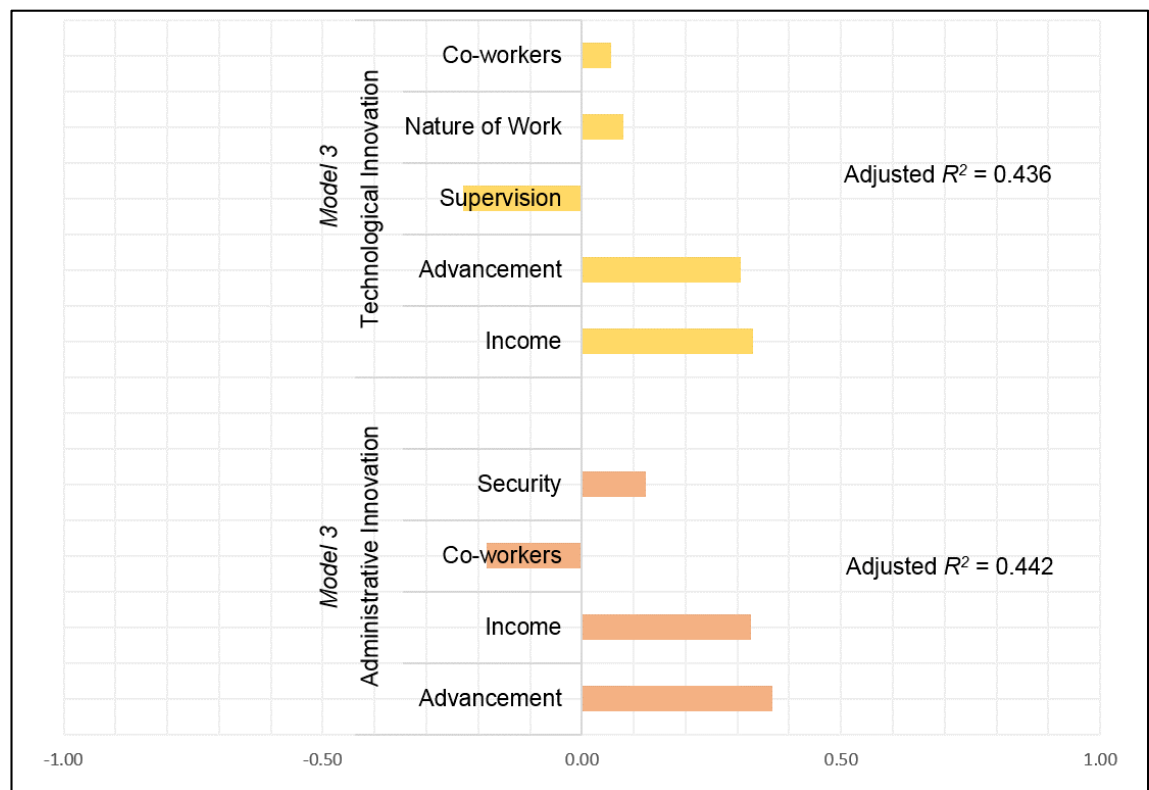


Figure 13: Automatic Linear Modelling: Predictor Importance

Furthermore, the negative relation between Co-workers and Administrative Innovation and Supervision and Technological Innovation of *Model 2* exists also in *Model 3*. In addition, the statistically significant predictors of *Model 2* having a high regression coefficient, appear also with high predictor importance in *Model 3*.

Consequently, it appears that *Model 3* encompasses *Model 2* (A and B), being potentially a more accurate superset of them.

6.5.3 Discussion

Based on *Model 3* analysis the following hypotheses of the study are supported: H_{4a} , H_{4b} , H_{5a} , H_{5b} and H_{6b} . The relationships between job satisfaction facets and the two dimensions of innovation are summarised in Figure 14. The width of the lines is proportional to the above-mentioned predictor importance and the dashed lines represent relationships that do not match with the corresponding hypothesised relationships. In addition, arrows that finish with ➤ indicate a statistical significant predictor according to *Model 2* (A and B).

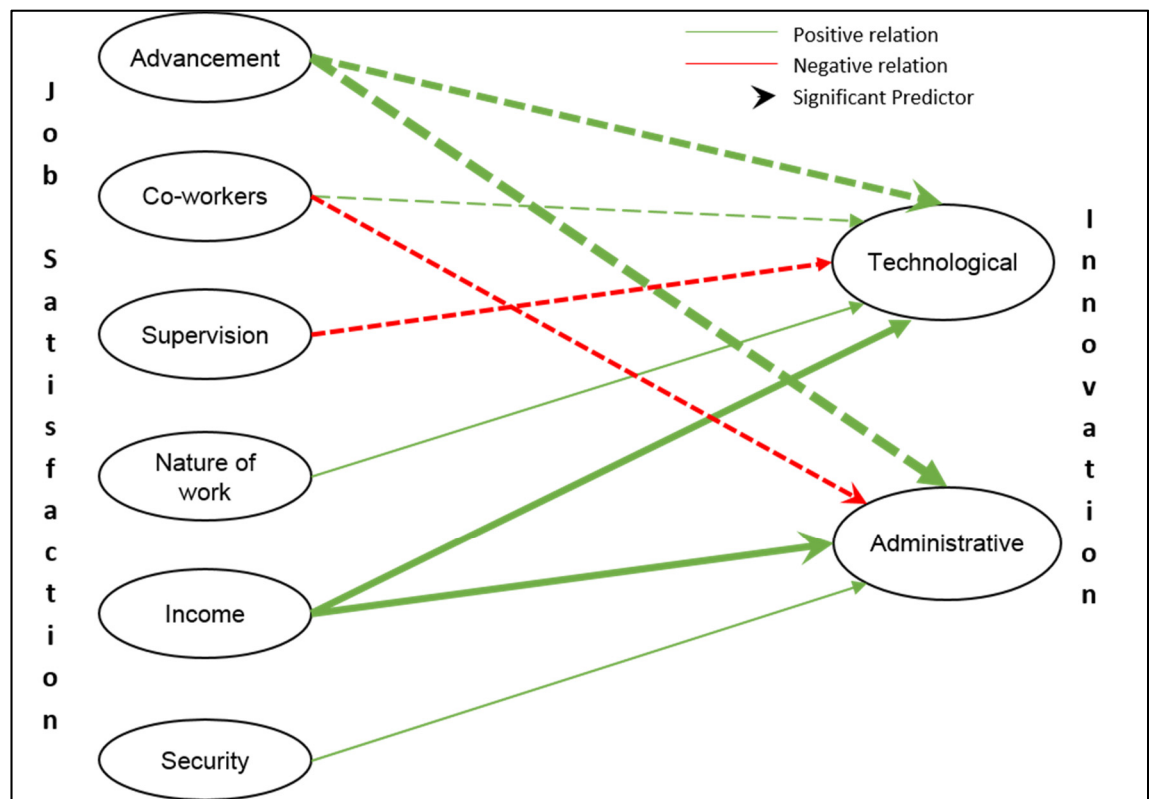


Figure 14: Relationships between facets of job satisfaction and the innovation dimensions

The following sub-sections analyse the above-mentioned non-matching relationships.

6.5.3.1 Advancement and Innovations

The hypotheses were not supported for the facet of advancement opportunities and the two types of innovation (H_{1a} and H_{1b}). It is interesting though here to examine the definition of advancement that was communicated to the participants of the questionnaire while they were answering the survey. Since the opportunities for advancement from career path perspective are limited in the case study organisation a dual definition of advancement was preferred, given by Cambridge³⁷ Dictionary as either “an improvement relating to a particular activity or area of knowledge” or a career improvement by “getting a more important position within an organisation or by moving to another company for a better job”. Consequently, advancement could be anything that improves an employee’s sense of competence.

³⁷ Advancement: <http://dictionary.cambridge.org/dictionary/business-english/advancement>

However, according to Eisenberger & Cameron (1996: 1155), “events that increase perceptions of competence or self-determination are assumed to enhance intrinsic motivation” and in turn, based on Patterson et al. (2013: 171), “they should increase the propensity for innovation”. Hence, the outcome of the empirical results about the positive relation of advancement with the two types of innovation is comprehensible.

6.5.3.2 Co-workers, Supervision and Innovations

Moreover, the hypotheses were not supported for the facets of relation with colleagues (co-workers) and relation with manager and technological and administrative innovations (H_{2a} and H_{2b} , and H_{3a} and H_{3b} respectively). Plausible explanations for the disagreement with H_{2a} , H_{2b} , and H_{3a} could be envisaged within the context of mood states, since the relations with colleagues and managers might generate different emotions.

The notion of “moods” at work refers to affective states that are encountered on the job; they do not demand complete attention, nor do they necessarily interrupt ongoing thought processes and behaviours but rather they provide the affective colouring for day-to-day events and generally they are characterised by two dimensions, either positive or negative (George & Brief 1992: 314). For example, active, enthusiastic, excited, strong, best characterize a state of high positive mood, whereas distressed, fearful, hostile, nervous indicate high negative mood (Ibid: 315). Patterson et al. (2013: 178-179) mention that, although further research is necessary, it appears that moods, positive and negative, and innovation are linked.

6.5.3.2.1 Co-workers and Innovations

A possible explanation of the negative relationship between co-workers and administrative innovation was already demonstrated earlier (see sub-section 6.5.1), which is in line with Janssen (2003: 357) saying that conflict with co-workers and reduced satisfaction with co-worker relations do indeed emerge for innovative employees.

On the contrary, the positive relationship between co-workers and technological innovation could be explained by the link between positive mood states and aspects of innovation, mentioned above. Since good relations between colleagues might create positive mood, an employee is more likely to be helpful (George & Brief 1992: 316). Yet, positive mood facilitates creativity (Madjar et al. 2002: 764; George & Zhou 2007), most probably towards daily work related matters, which are proximate to technological innovation.

6.5.3.2.2 Supervision and Technological Innovation

Contrary to hypothesis H_{3a} , there is a negative relationship between supervision and technological innovation. This is surprising considering that various researchers, for instance, George & Zhou (2007); Madjar et al. (2002: 765), highlight the role of managers and leaders in promoting employees' innovation. However, this relationship could be perhaps comprehended by the suggestion that negative mood may sometimes facilitate innovative behaviour (Patterson et al. 2013: 179). Negative moods, in this case, may be created due to tensions between an employee and his/her manager. Accordingly, Madjar et al. (2002: 759) report that creative problem solving might require individuals to experience negative feelings, such as tension and dissatisfaction. Additionally, Vosburg (1998: 170, 165) concludes that negative mood should facilitate task performance under strict optimising requirements and persons in a negative mood may choose optimising strategies and be more concerned with the quality of their ideas.

6.5.3.2.3 Supervision and Administrative Innovation

According to Paterson et al. (2013: 182), the relationship an employee has with their immediate line manager is directly related to how the employee perceives and describes the working culture. Consequently, the absence of a relationship between supervision and administrative innovation, which is more related to administrative and management issues, could be understood as a reaction to management practices in place that inhibit the likelihood for innovation to occur. For example, is there a human resources management system that rewards innovative behaviours in the workplace?

6.5.3.3 Security and Technological Innovation

Finally, opposite to hypothesis H_{6a} there is no relation between job security and technological innovation. Since technological innovation requires new skills and methods of operation, there is tendency for job loss, cutback of workers and labour turnover intention in organisations (Akintayo 2010: 34). Keeping this in mind and taking into account that approximately 50% of the survey participants have been working for less than three years in the case study organisation (see Table 4), there might exist plausible explanations of the afore-mentioned relationship absence related to the non-profit nature of the organisation. Su & Bozeman (2009: 1108) report that non-profit workers are intrinsically motivated by organisations' missions and by the significance of the job per se, which is

primarily related to technological innovation, and they typically do not enjoy the security of tenure. Therefore, the job security feeling might have not been established with them.

The next chapter completes this report presenting the conclusions, practical implications of the results of the study and its limitations, raising points for future research.

7 Conclusions

The purpose of this study was to examine the relationships between job satisfaction facets and two types of innovation, technological and administrative, in the context of non-profit organisations. There were three stages to the research: formulating a conceptual model defining, based on literature, the concepts and relationships of job satisfaction, its facets and the two types of innovation; studying a non-profit organisation and identifying a way of measuring the afore-mentioned relationships; and testing the conceptual model utilising statistical theories.

The results indicated that in the context of non-profit organisations, satisfaction with income and the relations with co-workers are statistically significant predictors of administrative innovation, in a positive and a negative way respectively. Plus, satisfaction with the opportunities for advancement is a positive significant predictor of technological innovation. Complementing these results, an automatic model, which was built using a software application (IBM SPSS Statistics 21), designated the relation with co-workers and the manager and the satisfaction with the income and the nature of work as further important predictors of technological innovation and the opportunities for advancement and the job security as additional important predictors of administrative innovation.

The results are considered by the author to have informative value about the experience of the average non-profit institution. The following two sections focus on the practical recommendations that can be offered given the above discussion, and the limitations of the study design and setting.

7.1 Practical Implications

The results of the study could have certain practical implications for the case study organisation.

First of all, as Sousa-Poza & Sousa-Poza (2000: 521) note, there are a number of good reasons for wanting to analyse job satisfaction and data related to job satisfaction; for instance, job satisfaction is one of the three most important predictors of overall well-being; it is argued that satisfied workers should have higher performance and provide with higher customer satisfaction; and it has been shown that low satisfaction leads to higher absenteeism and labour turnover rates. The descriptive statistics of the data (see

section 6.1) pinpoint a clear dissatisfaction of the employees of the case study organisation with the opportunities for advancement they have. In consequence, the management of the case study organisation might want to consider measures that improve the employees' sense of competence and increase their satisfaction with the particular aspect of the job. Additionally, there is a rather neutral feeling towards satisfaction with income, which might require attention taking into account that according to Sousa-Poza & Sousa-Poza (2000: 532), income is an important determinant of job satisfaction.

Besides, satisfaction with income and advancement has as effect a potential increase of technological and administrative innovations within the organisation, since both income and advancement are significant and/or important predictors of the two types of innovation. And of course **innovation matters** if the organisation wills to be successful, since the pattern is increasingly coming to favour those organisations that can mobilise knowledge and technological skills and experience to create novelty in their offerings (products or services) and the ways in which they create and deliver those offerings (Tidd & Bessant 2011: 5). In a turbulent economic climate, bright ideas well implemented can lead to valued new services and the efficient delivery of existing ones.

Furthermore, although there is a negative relationship between supervision and technological innovation, the author believes that this is not a sustainable relationship and it should be carefully observed by the case study organisation. Considering supervision as the way that the employee perceives and describes the working culture, it perhaps denotes that management styles need to be more flexible in order to cultivate an innovative environment where both idea generation and idea implementation are likely to occur. According to Tidd & Bessant (2011: 101), an innovative organisation is an integrated set of components that work together to create and reinforce the kind of environment that enables innovation to flourish. The set of components that appears to be linked to success is comprised by: shared vision, leadership and the will to innovate, appropriate organisation structure which enables creativity, learning and interaction, key individuals who energise or facilitate innovation, effective team working, organisation-wide continuous improvement activity, creative climate, internal and external customer orientation and extensive networking (Ibid: 100).

Additionally, the dissatisfaction with the relation with their colleagues for those employees who have been involved or are willing to contribute to administrative innovations may suggest a climate of conflict and debate. In this case, Tidd & Bessant (2011: 144) note

that the goal is not necessarily to minimise conflict and maximise consensus, but to maintain a level of constructive conflict consistent with the need for diversity and a range of different preferences and styles of creative problem solving, because similar creative preferences and problem solving styles are likely to be more harmonious but much less effective than those with mixed preferences and styles.

On the other hand, the positive relationship between satisfaction with relation with colleagues and technological innovation, possibly entails positive moods in the working environment. However, George & Zhou (2007) mention that when employees are experiencing predominantly positive moods, managers can encourage them to be systematic in their approach, pay attention to the facts at hand, put forward high levels of effort to address all relevant issues and alert them to potential problems and areas in need of improvement.

Overall, based on the above discussion and regardless of the type of innovation it seems that there is space for (re)definition of the innovation strategy of the case study organisation. Wu & Lin (2011: 46) point that is important for every organisation to identify which innovation strategy can lead to performance growth and what innovative actions can effectively improve the company's competitive advantages. Considering the non-profit nature of the organisation (see section 4.4), one of the drivers that it should take into account defining its innovation strategy is Operational Excellence, i.e. focusing on the needs of the customers, learning from advanced users, matching new technologies to users' needs and optimising existing activities in its processes. Another driver that should play imperative role is Cost Efficiency. Due to the economic crisis of the last years and the austerity measures in the Member States of the European Union the European Commission moves forward with budget reductions that eventually affect the funded agencies, like the organisation in question. Last but not least, focus should also be given to organisational innovation, which is a vital factor of influence on innovation quality, sustainability and performance, including potentially new leadership styles, organisational culture and commitments that can impact directly the employees' willingness to contribute.

7.2 Limitations and Suggestions for Future Research

The above results and recommendations need to be seen through the limitations of the study design and setting.

First of all, as it was mentioned in section 6.5.2, the sample size of the survey participants was small to ensure the desired amount of accuracy. As with any statistical analysis that is computed using sample data, the size of the sample in large part determines the “value” of the statistical results (Gross 1973: 17. **Cited in:** Knofczynski & Mundfrom 2008: 431). Future research could be conducted with the participation of either a larger organisation or simultaneously several non-profit organisations.

Secondly, although effort was taken to reduce the acquiescence bias (see section 6.3), a future study questionnaire should “contain both positively and negatively wording items within the same scale in order to avoid an acquiescence, affirmation, or agreement bias” (DeVellis 2003: 69). Furthermore, during the design of a future survey the format of the scales should be considered further. Visser et al. (2000: 239) recommend for bipolar scales (e.g. running from positive to negative with neutral in the middle), seven points and for unipolar scales (e.g. running from no importance to very high importance) five points.

Thirdly, the study took for granted the reliability and validity of the single item measures of the job satisfaction facets (see sections 6.2 and 6.3). In the case of a future research, a test-retest methodology could be used to estimate the reliability of the single item scales. Yeoh (2011: 20) mentions that test-retest reliability is estimated when the same test is administered to the same participant at two different time periods, and the scores on both administrations are correlated. As far as the validity is concerned, the single items of a future research could be measured against the corresponding factors of the current research, in order to identify whether they exhibit significant correlations.

Finally, the outcome of the automatic linear modelling (see section 6.5.2.1) does not indicate the statistical significance of the model and the predictor variables. Taking also into account the small size of the sample, it is not possible to extrapolate the findings to a generic theoretical model.

On the other hand, the author believes that the results of the research can find practical application in the case study organisation and similar size and type organisations. Additionally, it (research) adds a small contribution towards the clarification of the relationship of job satisfaction aspects with various types of innovation, especially in the frame of non-profit organisations.

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Job Satisfaction and Innovation in Non-Profit Organisations Survey

Thank you for participating!

The questions below concern only your current job. Please tick one button for each statement about your work to show how much you agree or disagree with it.

Technological Innovation

Technological innovations are directly related to the primary activities of the organisation and produce changes mainly in its operating systems. For example, the implementation of a program, which serves better the clients (end users) and is new to the usual organisational practice.

I have contributed / want to contribute to the ...

*implementation of new services / programs	<input type="checkbox"/>	Strongly agree
	<input type="checkbox"/>	Agree
	<input type="checkbox"/>	Neither agree nor disagree
	<input type="checkbox"/>	Disagree
	<input type="checkbox"/>	Strongly disagree
*change of an existing service / program into something new and recognisably different	<input type="checkbox"/>	Strongly agree
	<input type="checkbox"/>	Agree
	<input type="checkbox"/>	Neither agree nor disagree
	<input type="checkbox"/>	Disagree
	<input type="checkbox"/>	Strongly disagree
*extension of existing service(s) to new groups of clients (end users) previously not served by the organisation	<input type="checkbox"/>	Strongly agree
	<input type="checkbox"/>	Agree
	<input type="checkbox"/>	Neither agree nor disagree
	<input type="checkbox"/>	Disagree
	<input type="checkbox"/>	Strongly disagree

* use of new technologies to assist the clients (end users) or the employees of the organisation	<input type="checkbox"/>	Strongly agree
	<input type="checkbox"/>	Agree
	<input type="checkbox"/>	Neither agree nor disagree
	<input type="checkbox"/>	Disagree
	<input type="checkbox"/>	Strongly disagree
* cooperation with other organisations to improve the technology and innovations	<input type="checkbox"/>	Strongly agree
	<input type="checkbox"/>	Agree
	<input type="checkbox"/>	Neither agree nor disagree
	<input type="checkbox"/>	Disagree
	<input type="checkbox"/>	Strongly disagree

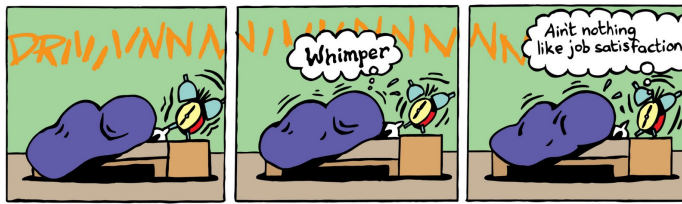
Administrative Innovation

Administrative innovations are oriented towards the efficiency and effectiveness of organisations' management processes and administrative systems. For example, the implementation of a structure, process, system, policy in the administrative core of the organisation that is new to the usual organisational practice.

I have contributed / want to contribute to the implementation of a new ...

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
* employee performance evaluation system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* employee incentive / reward system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* way of recruiting employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* organisational structure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* quality management system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Job Satisfaction Aspects



Please spare a moment to think about such aspects of your job as pay, [advancement](#), nature of work itself (opportunity to be creative, use a number of skills and work independently), supervision, colleagues, security, and

rate your satisfaction with them.

I am satisfied with

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
* my income	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* the opportunities I have for advancement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* the nature of my work itself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* the relation with my manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* the relation with my colleagues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* the security that the job offers me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

General

The understanding of demographic forces is believed to help us better prepare for possible problems :) If you have already answered all the previous questions thank you very much. Though, please, give us **10 more seconds** of your time to answer the following ones about your gender, age, education, tenure and post.

We are very grateful for your participation!

Gender

	Female	Male
* I am	<input type="checkbox"/>	<input type="checkbox"/>

Age

	29 years or younger	30-39 years	40-49 years	50-59 years	60 or more years
* I am	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Education

<p>* My highest education level is <input type="checkbox"/> high school or less</p> <p><input type="checkbox"/> post-high school technical training /degree</p> <p><input type="checkbox"/> bachelor's degree</p> <p><input type="checkbox"/> graduate degree</p>

Tenure

<p>* I have been working for this organisation for <input type="checkbox"/> 3 months or less</p> <p><input type="checkbox"/> 4 to 12 months</p> <p><input type="checkbox"/> between 1 to 3 years</p> <p><input type="checkbox"/> between 3 to 5 years</p> <p><input type="checkbox"/> 5 or more years</p>

Post

<p>No Yes</p> <p>* I have a managerial post <input type="checkbox"/> <input type="checkbox"/></p>

Proceed

Main Survey Invitation and Reminders

Main Invitation

From: [REDACTED]
Sent: Monday, July 08, 2013 9:24 AM
To: COST-Office
Subject: Innovation and Job Satisfaction Survey

Dear Colleagues,

The COST Office has received a request from Metropolia University in Helsinki, Finland, which is conducting a research on the relationship between job satisfaction and innovation in non-profit organisations, to participate in a related survey. The request has been accepted in order to support the particular research. You will find below the relevant information.

We heartily recommend that you participate in this study and fill in the questionnaire.

Many thanks in advance for your time and support.

Best regards,

[REDACTED]

=====

Dear participant,

The Business School, of Helsinki Metropolia University is launching a survey study, which examines the relationship among job satisfaction aspects and technological and administrative innovation in non-profit organisations.

By filling in the questionnaire, you produce valuable information that can be used in decision-making concerning employees' well-being and in scientific inquiry. Every response is very valuable, so we appreciate your answers. The responses will be processed in the strictest confidence and the individual respondents cannot be identified either from the survey tool or from the study report.

The questionnaire consists of 4 groups of questions, which are displayed in one WEB page, and it takes about 8 to 10 minutes to complete it. We hope that you answer the questions carefully and at your earliest convenience. The survey closes on Friday 23 August 2013 but we will appreciate if you spare these 10 minutes of your time as soon as possible so that we will not bother you with reminders.

You can access the questionnaire with the help of the following link:

<https://elomake.metropolia.fi/lomakkeet/8644/lomake.html>

We are very grateful for your participation!

=====

First Reminder

From: [REDACTED]
Sent: Tuesday, July 30, 2013 10:02 AM
To: COST-Office
Subject: Job Satisfaction and Innovation Survey

Dear Colleagues,

I forward you the following reminder about the job satisfaction and innovation survey in non-profit organisations, related to the research that is conducted by the Metropolia University in Helsinki, Finland.

Many thanks in advance for your time and support.

Best regards,

[REDACTED]

=====

Participate and make a difference!

Dear participant,

You have received an invitation to participate in a survey study of job satisfaction and innovation in non-profit organisations. If you have not answered yet, you can fill out the questionnaire through the following link:

<https://elomake.metropolia.fi/lomakkeet/8644/lomake.html>

It takes about 8 to 10 minutes to complete the questionnaire. We hope that you answer the questions at the latest by Friday 23 August 2013 but we will appreciate if you spare these 10 minutes of your time as soon as possible so that we will not bother you with reminders. Thank you for your replies!

=====

Dear participant,

The Business School, of Helsinki Metropolia University is launching a survey study, which examines the relationship among job satisfaction aspects and technological and administrative innovation in non-profit organisations.

By filling in the questionnaire, you produce valuable information that can be used in decision-making concerning employees' well-being and in scientific inquiry. Every response is very valuable, so we appreciate your answers. The responses will be processed in the strictest confidence and the individual respondents cannot be identified either from the survey tool or from the study report.

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and at your earliest convenience. The survey closes on Friday 23 August 2013 but we will appreciate if you spare these 10 minutes of your time as soon as possible so that we will not bother you with reminders.

You can access the questionnaire with the help of the following link: <https://elomake.metropolia.fi/lomakkeet/8644/lomake.html>

We are very grateful for your participation!

=====

Second Reminder

From: [REDACTED]
Sent: Tuesday, August 20, 2013 9:21 AM
To: COST-Office
Subject: Job Satisfaction and Innovation Survey

Dear Colleagues,

I forward you the following reminder about the job satisfaction and innovation survey in non-profit organisations, related to the research that is conducted by the Metropolia University in Helsinki, Finland.

We would really appreciate if you could connect and reply to this survey which will not take a lot of your time.

Many thanks in advance for your support.

Best regards,
[REDACTED]

=====

Participate and make a difference!

Dear participant,

You have received an invitation to participate in a survey study of job satisfaction and innovation in non-profit organisations. **If you have not answered yet, you can fill out the questionnaire through the following link:**

<https://elomake.metropolia.fi/lomakkeet/8644/lomake.html>

It takes about 8 to 10 minutes to complete the questionnaire. We hope that you answer the questions at the latest by **Wednesday 28 August 2013** but we will appreciate if you spare these 10 minutes of your time as soon as possible. Thank you for your replies!

=====

Dear participant,

The Business School, of Helsinki Metropolia University is launching a survey study, which examines the relationship among job satisfaction aspects and technological and administrative innovation in non-profit organisations.

By filling in the questionnaire, you produce valuable information that can be used in decision-making concerning employees' well-being and in scientific inquiry. Every response is very valuable, so we appreciate your answers. The responses will be processed in the strictest confidence and the individual respondents cannot be identified either from the survey tool or from the study report.

The questionnaire consists of 4 groups of questions, which are displayed in one WEB page, and it takes about 8 to 10 minutes to complete it. We hope that you answer the questions carefully and at your earliest convenience. The survey closes on Wednesday 28 August 2013 but we will appreciate if you spare these 10 minutes of your time as soon as possible so that we will not bother you with reminders.

You can access the questionnaire with the help of the following link: [https://elomake.metropo-
lia.fi/lomakkeet/8644/lomake.html](https://elomake.metropo-
lia.fi/lomakkeet/8644/lomake.html)

We are very grateful for your participation!

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Mapping of Innovation Variables to Survey Items

Variable	Survey Item
TI1	implementation of new services / programs
TI2	change of an existing service / program into something new and recognisably different
TI3	extension of existing service(s) to new groups of clients (end users) previously not served by the organisation
TI4	use of new technologies to assist the clients (end users) or the employees of the organisation
TI5	cooperation with other organisations to improve the technology and innovations
AI1	implementation of a new employee performance evaluation system
AI2	implementation of a new employee incentive / reward system
AI3	implementation of a new way of recruiting employees
AI4	implementation of a new organisational structure
AI5	implementation of a new quality management system