Antecedents and Consequences of Codification-Personalization Strategy: An Investigation of MSC-Status Companies in Malaysia

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I hereby certify that the work embodied in this dissertation project is the result of original research and has not been submitted for a higher degree to any other University or Institution.

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DEDICATION

This dissertation is dedicated to the memory of my late father.

ABBREVIATIONS

ANOVA	Analysis of variance
BRS	Business reply service
CEO	Chief executive officer
CFA	Confirmatory factor analysis
COP	Community of practice
EFA	Exploratory factor analysis
HNT	Hansen, Nohria and Tierney
ICT	Information and communication technology
IP	Internet protocol
IPO	Initial public offering
IQ	Intelligence quotient
IRSA	Identify, reflect, share and apply
IT	Information technology
KM	Knowledge management
MCAR	Missing completely at random
MDeC	Multimedia Development Corporation
MSC	Multimedia Super Corridor
PCA	Principal components analysis
RBV	Resource-based view
SECI	Socialization, externalization, combination and internalization
SWOT	Strength, weakness, opportunity and threat
UK	United Kingdom
US	United States of America

TABLE OF CONTENTS

Page

APPENDICES

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

SYNOPSIS

The landmark article by Hansen, Nohria and Tierney alerts companies against adopting a dual emphasis on the strategies of codification and personalization. This research investigates whether companies can adopt a hybrid strategy by straddling both codification and personalization without affecting organizational performance.

Based on a survey of 219 MSC-status companies in Malaysia, the research determined that organizational culture, leadership and organizational structure do not contribute to codification-personalization strategy. Statistically, the strength of organizational culture and the degree of transactional leadership are highly correlated; the extent of organic structure and the strength of organizational culture are moderately correlated; and the degree of transactional leadership and the extent of organic structure are uncorrelated. While level of codification does not contribute to organizational performance, a strong organizational culture and a high degree of transactional leadership contribute positively to organizational performance, whereas the extent of organic structure is insignificant in predicting organizational performance.

There is no statistical evidence to show that the further a company progresses along the knowledge life-cycle, the higher the level of codification; nor does firm size contribute to level of codification. However, knowledge life-cycle and firm size are highly correlated with each other.

The level of codification differs significantly across the six sectors of MSC-status companies. There is a difference in the choice of codification-personalization strategy between local- and foreign-owned companies, whereby the level of codification for local-owned companies is significantly higher than foreign-owned companies. Companies adopting a hybrid strategy have higher organizational performance than companies adopting either a codification or a personalization strategy, but the difference is not statistically significant.

The low Cronbach's alpha for local-owned companies indicates the absence of knowledge management strategy among Malaysian companies. In this light, the alignment of knowledge management strategy with business strategy is proposed for further study.

CHAPTER 1: RESEARCH PROPOSAL

1.1 INTRODUCTION

This dissertation investigates the antecedents and consequences of knowledge management (KM) strategy pertaining to codification and personalization. The two-pronged objective is: to examine the influence of various determinants on KM strategy, and to study how the choice of KM strategy influences organizational performance.

Companies in Malaysia which have been granted the status of Multimedia Super Corridor (MSC) constitute a context for this study. MSC is Malaysia's initiative for the global information and communication technology (ICT) industry. It was initiated in 1996 by the former prime minister, Tun Dr. Mahathir Mohamed, as part of Malaysia's long-term planning, Vision 2020, to become a fully developed nation and knowledge society by the year 2020.

Modeled after similar projects like Silicon Valley in California, Route 28 Corridor in Massachusetts and North Carolina Research Triangle in the US (Abdulai, 2004, p.78), implementation of MSC is divided into three phases from 1996 to 2020. In Phase One (1996-2003), five *cybercities* were successfully developed, and more than 1,000 companies, as well as universities, were granted the MSC status. In Phase Two (2004-2010), a web of similar corridors is being established in Malaysia, and a global framework of cyberlaws will be passed. By the end of Phase Three (2010-2020), the MSC agenda will be extended to the whole country (MSC, 2006).

With this unique corridor, Malaysia strives to attract leading ICT companies worldwide to locate their industries in MSC and undertake research, develop new products and technologies and export from this base. As recognition by the Malaysian government, the MSC status is granted to companies that participate in and undertake ICT activities in MSC. Currently, there are 1,180 MSC-status companies consisting of multinationals, foreign-owned and home-grown Malaysian companies (MSC, 2004).

As an attraction, MSC-status companies enjoy a set of incentives, inter alia: pioneer status with five-year 100-percent exemption from taxable statutory income, 100-percent investment tax allowance, eligibility for research and development grants, freedom to

source capital and borrow funds globally, and duty-free importation of multimedia equipment (MSC, 2006).

One of the key qualifications for the MSC status is the employment of a substantial number of knowledge workers, at least 15 percent of the total number of employees (excluding support staff) at all times. In 2003, 84 percent was achieved with more than 16,000 of the 19,061 employees classified as knowledge workers (MSC, 2004).

The remainder of this chapter is organized as follows. First, an overview of literature is introduced. This is followed by the research problems and the research design. Next, significance and delimitations of the research are discussed. Finally, the research plan and the outline of the dissertation are presented.

1.2 OVERVIEW OF LITERATURE

In the landmark article "What's your strategy for managing knowledge?" published in Harvard Business Review in 1999, Hansen, Nohria and Tierney (HNT) categorized KM strategy into codification and personalization. Codification refers to codifying and storing knowledge in databases where it can be accessed and used readily by anyone in the company. As for personalization, knowledge is closely tied to the person who developed it and is shared mainly through direct person-to-person contacts (Hansen, Nohria and Tierney, 1999, p.107; Newell et al., 2002, p.74). Therefore, codification strategy is based on person-to-document approach whereas personalization strategy is based on person-to-person approach.

The literature review in Chapter 2 commences with identifying the characteristics of knowledge with respect to codification and personalization, and various related theories of KM strategy. Subsequently, studies both in the west and in the east reveal that the KM strategy of codification or personalization is affected by various determinants: knowledge life-cycle (Birkinshaw and Sheehan, 2002, p.82), organizational structure (Narasimha, 2000, p.132; Brockman and Morgan, 2003, p.395; da Silva and Agusti-Cullel, 2003, p.48), firm size (Atherton, 2003, p.1380; Lee and Suh, 2003, p.334; Gottschalk and Khandelwal, 2003, p.104), employee characteristics (Taylor, 2004, p.53), leadership (Liebowitz, 2003, p.4; Gray, 2001, p.380), organizational culture (Carter and Scarbrough, 2001, p.222; Tyler and Swailes, 2002, p.235; Hansen, 1999, p.82), reward system (Earl, 2001, p.220; Bartol and Srivastava, 2002, p.73), ICT

(Bontis, 2001, p.36; Ng and Li, 2003, p.173; Langford, 2001, p.9), and environment (Ruddy, 2000, p.37; Amabile, 1997, p.46). The choice of codification-personalization strategy among different industries and various countries is also studied. Yet there is no affirmative answer according to the nature of industry, and one cannot conclude any convergence or divergence among countries.

HNT recommend companies pursue one strategy predominantly and use the second strategy to support the first, based on an 80-20 split: 80 percent follows one strategy and 20 percent the other. Organizations are warned against a dual emphasis on both strategies simultaneously; straddling the two strategies risks failing at both (Hansen, Nohria and Tierney, 1999, p.112).

Consistent with HNT's argument, Bartol and Srivastava highlight that companies tend to emphasize either a codification or a personalization strategy for knowledge-sharing (Bartol and Srivastava, 2002, p.66). HNT's proposition is also supported by many other authors, that for a KM strategy to be successful, it must adopt either a codification or a personalization strategy (Bornemann and Sammer, 2003, p.23; Koenig, 2003, p.14; Walters, 2000, p.428).

The business environment has been changing since HNT's categorization of codification and personalization strategies. Technology has been progressing by leaps and bounds. There exists now a research gap to be bridged between the two extremities. While HNT suggest that codification and personalization strategies may be mutually exclusive, at times companies have no alternative but to straddle both strategies of codification and personalization and adopt a *hybrid strategy*.

Previous research verifies the existence of such a gap; it is possible for codification and personalization to be pursued in tandem. The research suggests that HNT's proposal may be useful during the early stages of strategy development, but becomes less applicable over time (Scheepers, Venkitachalam and Gibbs, 2004, p.217). The hybrid strategy is also supported by several other researchers (Gottschalk and Khandelwal, 2004, p.121; Gloet and Berrell, 2003, p.86; Taylor, 2004, p.62; Maier and Remus, 2003, p.73).

Smith finds that all the organizations studied have mixed codification and personalization processes (Smith, 2004c, p.15). Other research based on case studies

shows that most of the eight companies choose a combination of personalization and codification (Torgeir and Reidar, 2002, p.410). A survey carried out in Australia reveals that 83 percent of respondents opine that an organization can use both codification and personalization together (Edwards et al., 2003, p.52). The mixture of face-to-face meetings, on-line databases and discussion forums suggests that a hybrid strategy may be the preferred way for KM (Umemoto, Endo and Machado, 2004, p.98).

Professional service firms, for example engineering, advertising, consulting, accounting and law firms, can successfully operate in a hybrid mode of codification and personalization. Codification is suitable for information-based knowledge while personalization is more suitable for experience-based knowledge (Lowendahl, Revang and Fosstenlokken, 2001, p.920). Both the codification and personalization domains are required in clinical practice, as medicine remains a human science with a strong scientific basis (Lusignan, Pritchard and Chan, 2002, p.297). A hybrid strategy is also necessary for designing organizations, since different approaches are appropriate for different units (McMahon, Lowe and Culley, 2004, p.318; Sheehan, 2000, p.13).

1.3 PROBLEM TO BE ADDRESSED BY THE RESEARCH

From the literature review, it has been established that the determinants of codification-personalization strategy that have been identified are: knowledge life-cycle, organizational structure, firm size, employee characteristics, leadership, organizational culture, reward system, ICT, and environment. From these, organizational structure, organizational culture and leadership are three determinants that have been intensively researched in terms of both width and depth. Subsequently, the main research questions to be addressed are:

1. **What is the influence of organizational structure, organizational culture and leadership on codification-personalization strategy, and in turn on organizational performance?**

In addition, within the framework of the research design, two further determinants, knowledge life-cycle and firm size, can possibly be studied with the research question:

2. **What is the influence of knowledge life-cycle and firm size on codification-personalization strategy?**

Previous studies have found no affirmative answer on the choice of codification-personalization strategy according to the nature of industry, and one cannot conclude any convergence or divergence among countries; thus calling for the following research question:

3. **Is the choice of codification-personalization strategy different between local- and foreign-owned companies, and among different sectors?**

Finally, a hybrid strategy has been suggested for modern business to address the research gap. This leads to the final research question:

4. **Does a hybrid strategy, if any, lead to better organizational performance?**

Specifically, twelve related hypotheses have been developed to test the research questions.

Hypothesis 1: The higher the extent of organic structure, the lower the level of codification.

Hypothesis 2: The stronger the organizational culture, the lower the level of codification.

Hypothesis 3: The higher the degree of transactional leadership, the higher the level of codification.

Hypothesis 4: The extent of organic structure and the strength of organizational culture are correlated.

Hypothesis 5: The extent of organic structure and the degree of transactional leadership are correlated.

Hypothesis 6: The strength of organizational culture and the degree of transactional leadership are correlated.

Hypothesis 7: The higher the level of codification, the better the organizational performance.

Hypothesis 8: The further a company progresses along the knowledge life-cycle, the higher the level of codification.

Hypothesis 9: The larger the firm size, the higher the level of codification.

Hypothesis 10: There is no difference in the choice of codification-personalization strategy among various sectors.

Hypothesis 11: There is no difference in the choice of codification-personalization strategy between local- and foreign-owned companies.

Hypothesis 12: Companies that adopt a hybrid strategy perform better.

1.4 RESEARCH DESIGN

The research method used in this study was selected after a systematic analysis based on quantitative methodology of a positivist paradigm. While surveys have been identified as the data collection method, a mail questionnaire has been selected as the measurement instrument to gather information required to test the hypotheses. Organizations form the unit of analysis, and they comprise 1,180 MSC-status companies in Malaysia from the sampling frame of MSC's official website (www.msc.com.my/cs/company).

Based on a statistical analysis approach, a minimum of five subjects per variable is required for factor analysis. For 40 questionnaire items, a minimum sample size of 200 is required (Coakes, 2005, p.154). This satisfies the minimum size of 200 recommended for strategic studies (Dillon, Madden and Firtle, 1994, p.235), and is also within the range of 30 and 500 suggested by Roscoe (cited in Cavana, Delahaye and Sekaran, 2001, p.279). When samples are subdivided into industrial sectors, a minimum sample size of 30 for each category is necessary, according to Roscoe's rule of thumb (cited in Cavana, Delahaye and Sekaran, 2001, p.279).

Data analysis involves profiling using descriptive statistics, measurement assessment in terms of reliability analysis and factor analysis, and inferential statistics using multiple regressions, t-test and ANOVA.

1.4.1 Ethics implications

Specified ethics standards have been ensured in compliance with guidelines set forth by the Faculty of Business and Law, University of Newcastle.

This research on KM strategy has no conflict of interest with the current job of the researcher. The participants bear no personal relationship to the researcher. There is no commercial or financial interest in proposing the research or in the outcome of the research.

Participants are invited to complete the survey via a letter of invitation. As the company names are in the public domain, there is no need for organizational consent. The questionnaire is designed to be anonymous and replying is on voluntary basis. No reward is offered to the respondents. Individual consent is implied by the completion and return of the questionnaire.

This is an applied business research on KM and no sensitive questions are asked. No unique identifiable data is being collected from the respondents; hence invasion of privacy is not an issue.

All completed questionnaires are handled in strict confidence, and will not be used for any purpose other than that for the study at hand. The questionnaires are stored securely in a locked cabinet and the softcopy of the data is stored in a computer file with password. Once the data has been analyzed, the study is completed and the dissertation examined, all questionnaires will be destroyed.

1.5 SIGNIFICANCE OF RESEARCH

This research is significant in making theoretical, managerial, policy and methodological contributions. First, this study strives to make a theoretical contribution in gaining new and important insights into the postulated hybrid strategy. It does not only address a gap in the body of knowledge, but an important gap (Perry, 1998).

Apart from contributing to the academic literature, the managerial contribution of this dissertation is twofold: first, it will raise awareness of various determinants that influence codification-personalization strategy and, secondly, is to advance understanding of inter-linked relationships among organizational structure, organizational culture, leadership and codification-personalization strategy. It is predicted that the findings will assist managers in organizational design.

In terms of policy contribution, the examination of the relationship between choice of

KM strategy and organizational performance will reveal the merit of each strategy: codification, hybrid or personalization. Thus, managers can use the information to make decision on the appropriate strategy to pursue.

Finally, in terms of methodological contribution, when importing scales from other disciplines, this research contributes to new knowledge by updating, refining, and adapting the scales to the KM discipline (Varadarajan, 1996, p.5). By transferring western-generated scales to the eastern context, the reliability and validity of borrowed scales will be tested for their psychometric properties (Sekaran, 1983, p.63). Besides adding to the body of knowledge, the results will pave the way for further research.

1.6 DELIMITATIONS

There are three potential delimitations of the research design pertaining to external validity (generalizability), internal validity and construct validity. First, this study is based on a positivist approach of which the goal is to seek out propositions that can be generalized to an infinitely large number of phenomena, people and settings. In other words, the positivists endeavor to identify context-free generalizations, or nomothetic statements (Hudson and Ozanne, 1988, p.511). This study is limited to MSC-status companies in Malaysia. Despite its representation of a spectrum of sectors, the generalizability of the results beyond the sampling frame remains unknown.

The second delimitation relates to internal validity. This study is based on cross-sectional data. Future research should analyze the dynamics of change in the antecedents and consequences of codification-personalization strategy by employing longitudinal data.

Thirdly, with regard to construct validity, the measure of organizational performance in this study may not be comprehensive. Further research should extend the measure of organizational performance using objective measures, in addition to, or in combination with, subjective approach adopted in this research. One comprehensive tool that is now widely used by US companies is Kaplan and Norton's Balanced Scorecard, which combines financial with non-financial measures, encompassing financial perspectives, customer perspectives, innovation and learning perspectives, and internal business perspectives, in evaluating organizational performance (Kaplan and Norton, 1993, p.136; Arora, 2002, p.249). Nevertheless, it is not possible to include every potential measure

when undertaking a study, thus comprehensive perspectives will be left to future studies.

1.7 RESEARCH PLAN

Background research for this study commenced in mid-July 2005 and continued until July 2006. Salient monthly activities are presented as follows.

Feb & Mar 2006 Preparation of Application for Ethics Approval and developing research proposal with Project Supervisor.

27 Mar 2006 Milestone 1: Closing date for Application for Ethics Approval.

April 2006 Revising Chapters 1 to 3: research proposal, literature and methodology based on supervisors' feedback.

May 2006 Preparation of questionnaire package and respondent database. Upon the ethics approval, sending out the questionnaires and collecting replies.

June 2006 After data analysis, completing Chapter 4 in finalizing and interpreting results.

July 2006 Completing Chapter 5: discussion of findings, contributions, limitations and implications for further research.

Finalizing title page, acknowledgements, abbreviations, table of contents, synopsis, references and appendices.

Draft 1: Reviewing with supervisors.

August 2006 Submission to a proof-reader for major editing.

Draft 2: Reviewing with supervisors and undertaking the final editing.

September 2006 Submission of DBA dissertation.

18 Sep 2006 Milestone 2: Due date of DBA dissertation.

1.8 OUTLINE OF DISSERTATION

Chapter 1. Chapter 1 introduces the dissertation topic, the literature overview, the research method, significance and delimitations of the research, the research plan and the chapter outline. Essentially, there is no affirmative answer on the choice of codification-personalization strategy according to the nature of industry, and one cannot conclude any convergence or divergence of codification-personalization strategy among countries. A hybrid strategy is thus suggested for modern business to address the research gap.

Chapter 2. Chapter 2 reviews the literature by identifying the characteristics of knowledge with respect to codification and personalization, and various related theories of KM strategy. Subsequently, studies by researchers both in the west and the east reveal that codification-personalization strategy is affected by various antecedents: knowledge life-cycle, organizational structure, firm size, employee characteristics, leadership, organizational culture, reward system, ICT, and environment. The choice of codification-personalization strategy among different industries and various countries is also studied.

Chapter 3. In Chapter 3, a conceptual framework is formalized with four research questions and twelve related hypotheses. Mail questionnaire survey is selected based on quantitative methodology of a positivist paradigm. In sample design, population has been defined, with appropriate unit of analysis, sampling frame and sample size. Questionnaire development and administrative procedure have also been included, taking into consideration ethical issues.

Chapter 4. Data analysis is conducted in Chapter 4. First, results are interpreted by means of descriptive statistics. Secondly, measurement assessment is conducted using reliability analysis and factor analysis. Thirdly, in inferential statistics, standard and hierarchical regressions are used to investigate the correlations of antecedents and consequences with codification-personalization strategy, whereas t-test and ANOVA are used to study the differences between local- and foreign-owned companies, and among different sectors.

Chapter 5. Chapter 5 answers the research questions by drawing together the findings and outlining implications for theory, policy and practice within the limitations

and delimitations of the study.

1.9 CONCLUSION

This chapter, Research Proposal, lays the foundation for the dissertation. It introduces the research objectives, literature overview, conceptual framework, research questions and hypotheses, before the research methodology is described and the significance of research justified. Finally, the delimitations, the research plan and the contents of each chapter are provided. Based on these foundations, the dissertation can proceed with a detailed description of the research. Chapter 2 will present a review of the literature relevant to the themes of the research at hand.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The objective of this chapter is to review the literature on HNT's codification-personalization strategy that has been researched. This chapter examines the characteristics of knowledge with respect to codification and personalization, the theories of KM strategy, the various determinants of codification-personalization strategy, and differences in the choices among industries and countries.

In the process of identifying a research gap, the literature review finds that there is no conclusive answer on the choice of codification-personalization strategy. A hybrid strategy is thus suggested for modern business.

2.2 KNOWLEDGE MANAGEMENT STRATEGY

2.2.1 Characteristics of knowledge

Knowledge is a renewable and accumulating resource of the firm. Knowledge cannot be stored in computers; it can only be stored in the human brain. Although knowledge cannot originate outside the head of a person, it is argued that knowledge can be embedded in organizational processes, routines, networks, and document repositories. Nonetheless, knowledge is never complete outside of an individual (Gottschalk, 2005, p.58).

Atsushi and Yoshiteru advocate the phenomena of depreciation and equivocality of knowledge. From the result of their simulation model, they recommend personalization strategy to prevent depreciation in knowledge-sharing, and codification strategy to mitigate mismatch in knowledge transfer (Atsushi and Yoshiteru, 2004, p.186).

Knowledge also exhibits the characteristics of replication and reusability. Replication, often called the 'McDonalds approach', refers to conducting operations in a similar way wherever the geographical location (Korac-Kakabadse, Kouzmin and Kakabadse, 2002, p.65). Some of the features, which are replicable, may be tacit (Winter and Szulanski, 2001, p.734). Overall, replication entails predominantly codification strategy. In terms of reusability, those law firms in Norway that have already used information technology (IT) continue to use IT to support KM in their firms, whereas law firms that had a

limited use of IT in the past maintain a distant relationship to the technology (Gottschalk, 2000, p.125).

2.2.2 Theories of knowledge management strategy

One of the most important tasks for management is to search continuously for the best strategy to elevate the organizational performance. The process of strategic management affects organizational success by formulating, implementing, and evaluating cross-functional decisions. Strategies have multi-dimensional consequences as they affect an organization's long-term prosperity, typically for at least five years (David, 2001, p.5). KM is essentially a strategic objective as companies seek to enhance their competencies, capabilities and processes in order to gain competitive advantage (Nielsen, 2005, p.1).

The term codification was used as early as 1996, before HNT, by Harkness, Kettinger and Segars, who consider that the progression of information system can be framed as a series of five evolutionary stages: exploration, discovery, formalization, process-think, and process-link. The primary activity that supported the phase of formalization is codification (Harkness, Kettinger and Segars, 1996, p.354).

An integrated framework has been developed, comprising five key KM activities: personalization, creation/innovation, codification, discovery and capture/monitor (Milton et al., 1999, p.618). Tell identifies four different knowledge types: objective, subjective, personal and institutional (Tell, 2004, p.443). Gray and Meister consider three generic forms of communication, namely one-to-one, one-to-many, or many-to-many (Gray and Meister, 2004, p.822).

In Nonaka's SECI model, knowledge is created dynamically through conversion between tacit and explicit knowledge, in which SECI captures socialization, externalization, combination, and internalization (Newell et al., 2002, p.49). Research demonstrates that socialization entails a personalization strategy, while combination needs a codification strategy (Belsis, Kokolakis and Kiountouzis, 2005, p.200). Personalization can be maximized using the IRSA model: (1) Identifying key knowledge; (2) Reflecting on what the organization knows; (3) Sharing that knowledge; and (4) Applying that knowledge (Davidson and Voss, 2002, p.115). On the other hand, codification is a key element of the enterprise-wide process encompassing creating,

identifying, collecting, indexing, codifying, organizing, evaluating, accessing and leveraging (Frey, 2001, p.39).

Sørensen and Lundh-Snis present two views of the KM process. The primary functions of KM are capturing and codifying knowledge in the cognitive model, and knowledge-sharing through networking in the community model (Sørensen and Lundh-Snis, 2001, p.86). Another two contrasting views are based on process-centered approach, which is similar to personalization, and product-centered approach that focuses on codification (Apostolou and Mentzas, 2003, p.354).

Apart from HNT's codification and personalization strategies, Wiig discussed a third strategy – strategic management of intellectual capital, and a fourth strategy – the enterprise-effectiveness strategy where the emphasis is on applying intellectual assets in the best interests of the organization (Wiig, 1999, p.157). According to Strassman, intellectual capital is what is left over after suppliers, employees, creditors or shareholders and the government have been paid, and obsolete assets replaced (Ernst and Young, 1999).

The first-generation KM focuses on timely information provision for decision support. The second-generation KM focuses on tacit-explicit knowledge conversion, spearheaded by the SECI model (Snowden, 2002, p.100). In the third generation, an organization needs to create an environment to self organize and self manage its knowledge, to permit knowledge transfer on a just-in-time basis (Snowden, 2002, p.108). From the KM perspective, knowledge is more valuable when it is delivered just-in-time, rather than being available just-in-case (Tiwana, 2002, p.186).

2.3 DETERMINANTS OF KNOWLEDGE MANAGEMENT STRATEGY

The codification-personalization strategy is affected by various determinants either individually or interactively: knowledge life-cycle, organizational structure, firm size, employee characteristics, leadership, organizational culture, reward system, ICT, and environment, amongst others.

2.3.1 Knowledge life-cycle

Management directly influences the KM life-cycle by aligning and integrating its phases with the overall business strategy and other business initiatives. Management is also

responsible for providing an environment supportive of KM activities. By helping define the corporate policy, management can help support each phase of the KM life-cycle (Bergeron, 2003, p.94).

The knowledge life-cycle can be represented by a simple S-curve, along which knowledge progresses through four stages: creation, mobilization, diffusion and commoditization (Birkinshaw and Sheehan, 2002, p.76). Similarly, Boisot illustrates the relationship between codification, abstraction and diffusion in a social learning cycle by means of a curve. The curve shows that social learning is more effective in a given time period by codified knowledge than by uncodified knowledge (Rooney, Hearn and Ninan, 2005, p.183).

Lee and Hong classify KM cycle in terms of capturing, developing, sharing and utilizing (Lee and Hong, 2002, p.24), whereas Bergeron categorized the KM life-cycle into eight discrete stages: (1) knowledge creation or acquisition, (2) knowledge modification, (3) immediate use, (4) archiving, (5) transfer, (6) translation/repurposing, (7) user access and (8) disposal (Bergeron, 2003, p.84).

Meanwhile, Patriotta provides a description of the dynamic cycle that leads to the production of generic knowledge contents, referred to as organizational black boxes. This cycle can be articulated in three main processes: creation, utilization, and institutionalization (Patriotta, 2003).

Wiig's knowledge development evolution cycle consists of five stages (Wiig, 2004, p.92) as follows:

1. *Knowledge development*. Knowledge is developed through learning, innovation, creativity, and importation from outside.

2. *Knowledge acquisition.* Knowledge is captured and retained for use and further treatment.

3. *Knowledge refinement.* Knowledge is organized, transformed, or included in written material and knowledge-bases to make it available to be useful.

4. *Knowledge distribution and deployment.* Knowledge is distributed to points-of-action through education, training programs, automated knowledge-based systems,

and expert networks, to name a few.

5. *Knowledge leveraging.* Knowledge is applied or otherwise leveraged as the basis for further learning and innovation.

Another KM cycle is divided into four sequential and often overlapping phases: acquisition, organization, dissemination, and application (Parikh, 2001, p.29). No company can realistically aim to be active in all four stages of the cycle. Many companies have struggled, usually in vain, trying to span all four (Birkinshaw and Sheehan, 2002, p.82).

In aligning business and KM practices, Mendes, Gomes and Bátiz-Lazo propose a five-stage KM life-cycle: (1) identification of the knowledge-base, (2) knowledge creation and capture, (3) knowledge storage and retrieval, (4) knowledge-sharing and dissemination, and (5) knowledge application, trading, and exploitation (Gupta and Sharma, 2004).

Nissen, Kamel and Sengupta observe a life-cycle associated with KM. Integrating the existing literature (Nissen, 1999; Despres and Chauvel, 1999; Gartner Group, 1999; Davenport and Prusak, 1998), they synthesize an amalgamated KM life-cycle model, as shown in Table 2.3.1 (Nissen, Kamel and Sengupta, 2000, p.30).

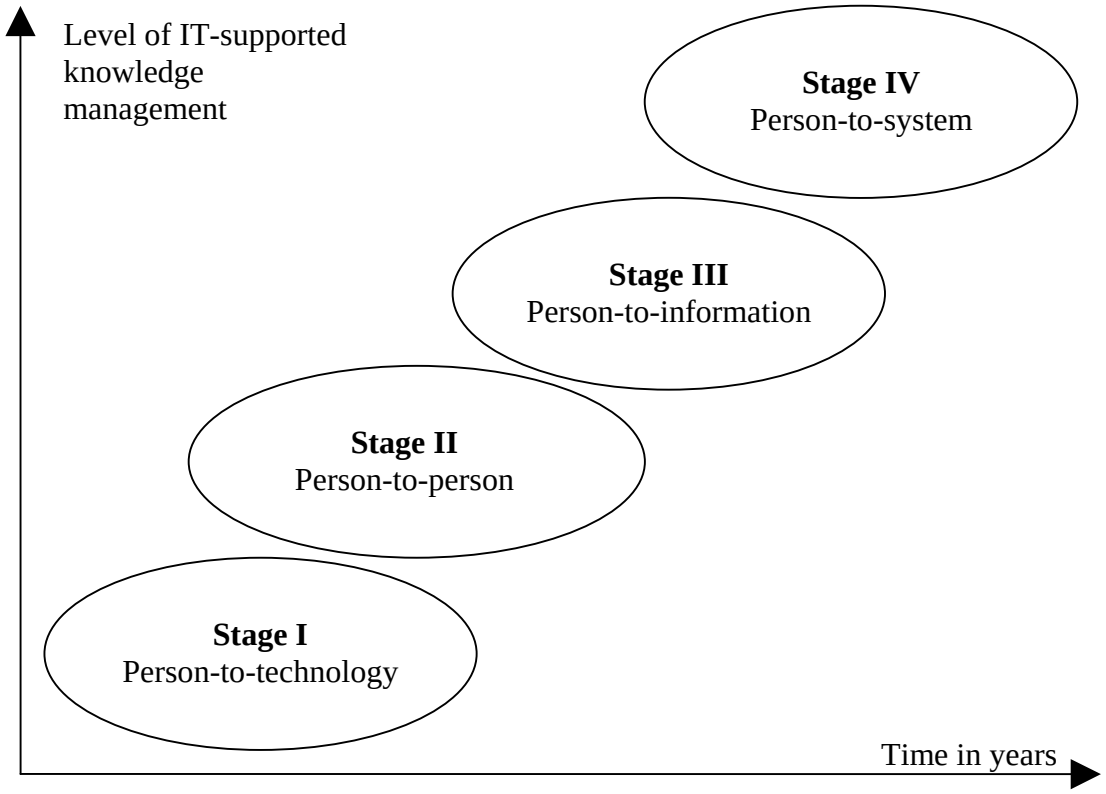
Table 2.3.1: Knowledge management life-cycle model
(adopted from Nissen, Kamel and Sengupta, 2000, p.30)

Model	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Nissen, 1999	Capture	Organize	Formalize	Distribute	Apply	
Despres and Chauvel, 1999	Create	Map/bundle	Store	Share/transfer	Reuse	Evolve
Gartner Group, 1999	Create	Organize	Capture	Access	Use	
Davenport and Prusak, 1998	Generate		Codify	Transfer		
Amalgamated	Create	Organize	Formalize	Distribute	Apply	Evolve

The stages of Gottschalk's growth model (refer Figure 2.3.1) can be interpreted as alternative strategies, where the alternative strategies are person-to-technology strategy, person-to-person strategy, person-to-information strategy, and person-to-system strategy. A comparison of these four alternatives can be made to the classification into personalization versus codification strategy by HNT. In this comparison, Stages I and II

represent personalization, while Stages III and IV represent codification. Therefore, it can be argued that a codification strategy is more dependent on knowledge management systems than a personalization strategy (Gottschalk, 2006, p.113).

Figure 2.3.1: Stages of growth model for knowledge management technology
(adapted from Gottschalk, 2006, p.112)



2.3.2 Organizational structure

In his book published in 1962, *Strategy and Structure*, noted business historian Alfred Chandler concludes that major companies in the US generally follow a pattern of strategy development and then structural change. Other researchers have questioned the structure-follows-strategy approach, claiming that it is too simplistic (Bartol and Martin, 1998, p.285). Subsequently, there have been widespread agreements that structure can have a profound impact on strategy through its direct effect on the strategic decision-making process (Frederickson, 1986, p.280).

According to Coakes, the organizational structure is characterized by three types of knowledge conversion (Coakes, 2003) as follows:

Hierarchical structure: where top-level management assumes a leadership role and gives oral and/or written instructions to their subordinates. The senior executives are, therefore, the creators of the managerial concepts of decision-making. In this type of organization, knowledge is created explicitly.

Flat structure: where low and middle management levels operate as entrepreneurs. They contribute their opinions and are sponsored by the senior executives. In this type of organization, the senior executives provide support rather than give oral and/or written instructions and, therefore, knowledge is created tacitly within low and middle management.

Hybrid structure: where management levels are important actors who work together in an organization. The senior executives articulate the visions of the organization and the junior members deliver the visions. Middle management synthesizes both tacit knowledge from senior executives and junior members, and tries to deliver the vision explicitly in terms of the creation of new products and services. In this type of organization, knowledge is created tacitly and explicitly, and shared among all levels of management.

Matrix organization structures are highly integrative, and it is not accidental that they were first developed to aid technological innovation (Kanter, 1988, p.100). Personalization strategy is thus very much inherent within an organization of matrix structure to cater for geographical dispersion. Three basic types of matrix structures exist. These are the functional matrix, the balanced matrix, and the project matrix (Gupta and Sharma, 2004).

In contrast to hierarchical organizations, Ryu and Jung (cited in Gupta and Sharma, 2004) argue that future organizations are fractal-based. Essential features of fractals are as follows:

1. Fractals are self-similar and provide services.

2. Fractals develop self-organization in two ways: operative way where procedures are optimally organized with suitable methods; tactical and strategic way where fractals determine, formulate, and try to achieve their goals dynamically and autonomously.

3. Fractals are goal-oriented; the goal system consists of the coherent combination of

individual and corporate goals.

Beveren argues that whilst many have identified that personalization supports knowledge flow and the generation of new knowledge within private-sector organizations, it might be less simple in the public sector where power structures and hierarchical levels are culturally embedded (Beveren, 2003, p.93). Hierarchical organizations promote hoarding knowledge to gain power. Knowledge is the foundation of power: the higher up you are, the more knowledge resources you have available to use in maintaining and enhancing your position (Buckman, 2004). The challenge is to move from knowledge hoarding to a culture of knowledge-sharing, by flattening the organizational structure.

The shift towards a knowledge-based economy involves a shift in organization away from top-down hierarchical structures to flatter structures such as networks of semi-autonomous teams (Rooney, Hearn and Ninan, 2005, p.123). A team-based structure is an essential characteristic of organizational structures pertinent to value creation through knowledge utilization (Janz and Prasarnphanich, 2003, p.355). Knowledge-intensive firms have been shown to encourage the development of solid personal and team relationships, norm-based control, and high level of connections across boundaries (Nahapiet and Ghoshal, 1998, p.260).

A team developing a new product or service requires personalization at the initial stage of a project in order to ease subsequent virtual project work (DeFillippi, 2002, p.10). Inter-project learning occurs through personalization rather than codification (Williams, 2003, p.449). Personalization is supported by speedy informal networked channels to glean and convey knowledge between project stakeholders (Sense, 2004, p.136). Boundary spanners may act as links among individuals and between groups (Alavi and Leidner, 2001, p.124).

Mechanistic structures are more suited to the more stable environments while organic structures are more appropriate for dynamic environments (Senior, 2002, p.112). Organic structure is preferred to mechanistic one for personalization strategy, exhibiting the following dimensional characteristics: (1) flat and team-based, (2) divisionalized, (3) decentralization of power and control, and (4) a higher level of informality (Wang and Ahmed, 2003, p.55). Other characteristics are globalization of business, existence of

inter-organizational networking and cross-functional teams (Newell et al., 2002, p.99). Top-down hierarchical structures are inappropriate for personalization especially in creating and harnessing intellectual capital, whereby the formation of specific teams eliminates structural rigidity (Narasimha, 2000, p.132).

A flexible approach to existing knowledge, as represented in an organic organizational structure, positively moderates the relationship between existing knowledge and the acquisition of new, innovative information. An organic structure helps the organization use its existing knowledge to gain a shared understanding of new information (Brockman and Morgan, 2003, p.395). Thus, codification strategy is recommended for structure-centric organizations while personalization strategy for people-centric ones (da Silva and Agusti-Cullel, 2003, p.48).

Learning organizations are generally market-oriented, having an entrepreneurial culture, a flexible and organic structure, and a facilitative leadership (Gupta and Sharma, 2004). For example, KM efforts in Hewlett Packard (HP) are largely bottom-up, with little involvement by senior management. Having a tradition of divisional autonomy, HP's biggest challenge in KM is probably knowledge-sharing across the entire organization (Davenport and Volpel, 2001, p.218).

2.3.3 Firm size

Based on an empirical study of a cross-sectional sample of 151 multinationals, Simonin finds tacitness as the most significant determinant of knowledge transferability, moderated respectively by the firm's level of collaborative experience, the duration of alliance and firm size (Simonin, 1999, p.463).

Smaller businesses tend to be dominated by one or few owner-managers. Therefore, the nature of knowledge in small businesses is personalization, in contrast to codification that underpins large businesses (Atherton, 2003, p.1380). For a small firm to augment lifelong learning, the firm must initiate some fundamental changes across certain aspects of its operations involving moving from a lower-level to a higher-level learning style, upgrading competencies and creating a formalized learning system (Chaston et al., 2001, p.1429).

Based on interviews with thirteen Korean organizations, research shows that small-to-

medium-sized companies prefer personalization to codification because of the small number of employees, problems of high replacement rates and difficulty with securing high quality human resources (Lee and Suh, 2003, p.334).

It has been argued that larger firms are more advanced in codification than smaller ones. Survey results from Australian law firms support this by identifying the number of lawyers and the number of IT personnel in the firm as determinants of KM technology projects in the firms (Gottschalk and Khandelwal, 2003, p.104). This may be attributed to the failure of knowledge-sharing in efforts of linking KM to a law firm's strategy, culture, IT and reward system (Battersby, 2004, p.10).

Davenport and Prusak point out that one of the difficulties that organizations face is how the size and the geographical location of its workforce make it difficult to locate existing knowledge. From their research they identify that it is easier to locate critical knowledge in organizations that consist of up to three hundred people. However, once organizations go beyond this size managing knowledge becomes more difficult, particularly where employees are located in different geographical locations (Evans, 2003).

2.3.4 Employee characteristics

Employees can be either intuitive, referring to people who make immediate judgments based on feeling, or analytic, who make judgments based on reasoning. In relation to the preferred method of communication, analytics favor codification while intuitives elect for face-to-face personalization (Taylor, 2004, p.53).

The choice of codification or personalization is also believed to be associated with seniority, where senior managers exhibit a propensity towards personalization, whereby research reveals that their usage of computer-mediated modes of communication and KM system is likely to be lower (Taylor, 2004, p.53).

Previous study suggests that gender has a significant effect on the KM system usage, whereby males using all KM system components significantly more than females who prefer personalization. If this is true, then organizations should not rely solely on codification. Rather, they should acknowledge female preferences for face-to-face interaction (Taylor, 2004, p.61).

2.3.5 Leadership

There are four pillars of KM: people, processes, technology and leadership (Ramanujan and Kesh, 2004, p.274). The case study developed over a ten-week period at Jason Organization confirms that leadership commitment to KM is a critical part of the overall strategy in the organization's survival and potential growth (Liebowitz, 2003, p.4). Knowledge is manageable only insofar as leaders embrace and foster the dynamism of knowledge creation. Their task is to manage knowledge emergence (Nonaka and Konno, 1999, p.52). It is necessary to have champions who basically embrace three broad sets of tasks: (1) member development, (2) value management, and (3) moderation and facilitation (Williams, 1999, p.55).

Leadership is associated with power. Gray has shown how the use of knowledge repositories in organizations can lead to a shift of power away from employees and towards managers (Gray, 2001, p.380). It is crucial to embrace an understanding of the relationship between knowledge and power, in the politics of knowledge (Marshall and Brady, 2001, p.110).

Should a leader be a knowledge expert, or a knowledge facilitator? There are mixed views on this subject. Previous case study suggests that leaders who act as facilitators add value by focusing their energy on encouraging and facilitating multi-directional knowledge exchanges. This helps to ensure that knowledge is spread across the organization, rather than remaining localized. However, a study of how leaders develop creative potential in their teams identifies that unless leaders are recognized as being the best in their field they are unlikely to have the necessary qualities to make them good leaders. Research also demonstrates that having a knowledgeable leader adds to the leader's credibility, from the team's perspective (Evans, 2003).

Daft highlights the transactional-transformational perspective of leadership. While the transactional leader motivates subordinates to perform as expected, the transformational leader typically inspires followers to do more than originally expected (Daft, 2003, p.532). Transactional leadership involves managing, while transformational leadership is about leading. Transactional leadership improves organizational efficiency, whereas transformational leadership steers companies onto a better course of action (McShane and Von Glinow, 2003, p.430).

As advanced by Bass (cited in Senior, 2002, p.234), transactional leadership has three dimensions. The first dimension is *contingent reward*. The leader rewards followers for attaining the specified performance levels. The second dimension of transactional leadership is *active management-by-exception*. The active form characterizes a leader who actively seeks deviations from standard procedures and takes action when irregularities occur. The third dimension is *passive management-by-exception*, typified by leaders who only intervene after deviations and irregularities have occurred.

Therefore, codification strategy is very much consistent with the active form of management-by-exception. In order to conform to a high level of codification, the leader in the active form searches for deviations, rather than waiting for problems to materialize.

2.3.6 Organizational culture

Research conducted at Cranfield School of Management in the UK has identified culture as at the top of the list of concerns among organizations regarding knowledge management (Gottschalk, 2005, p.39). Organizational culture is an important factor in shaping the attitudes of employees towards knowledge-sharing in terms of codification and personalization (Carter and Scarbrough, 2001, p.222). Consistent with a systemic view of knowledge and its transfer, if knowledge cannot be shared, inevitably it has limited organizational value (Connell, Klein and Powell, 2003, p.143). For KM to succeed, the following cultural conditions need to be in place: the existence of shared language and vocabulary, the sharing of collective narratives, the development of trust, adherence to common norms, a web of obligations and expectations, and identification with the group or community (Tyler and Swailes, 2002, p.235).

Organizational culture is increasingly recognized as a major barrier to leveraging intellectual assets. De Long and Fahey identify four ways in which culture influences the behaviors central to knowledge creation, sharing and use. First, culture and particularly subcultures shape assumptions about which knowledge is worth managing. Secondly, culture defines the relationships between individual and organizational knowledge, determining who is expected to control specific knowledge, as well as who must share it and who can hoard it. Thirdly, culture creates the context for social interaction that determines how knowledge will be used in particular situations.

Fourthly, culture shapes the processes by which new knowledge is created, legitimated, and distributed in organizations (De Long and Fahey, 2000, p.113).

Experience at Buckman Laboratories demonstrates that the entire basis of a knowledge-sharing culture is trust. For such a culture of trust to exist in an organization, several key elements must be present: (1) the employees must trust the organization, (2) the organizational culture must reflect the four basic virtues: justice, temperance, prudence, and fortitude, and (3) the company's statement of values must govern decisions at all levels, all the time (Buckman, 2004).

Besides being a pivotal component of the organizational culture, trust is also crucial for teamwork. In the 'interactionist model', there are three distinct states of the trust experience: distrust, conditional trust and unconditional trust (Jones and George, 1998, p.538). To evolve trust from conditional to unconditional and prevent dissolution to distrust over time, two main criteria must be satisfied: (1) reciprocation of positive expectations and favorable attitudes, and (2) alignment of values. Trust needs to be established through personalization before people can collaborate electronically without skepticism (McDermott, 1999, p.104).

Computer-mediated collaboration requires trust, insofar as workers cannot directly observe the actions of their colleagues and develop cohesion through normal processes of personalization. Without trust, companies are compelled to implement potentially intrusive and time-consuming work monitoring and behavioral control practices, thus reducing self-organizing flexibility and speed of response (DeFillippi, 2002, p.10). The impact of trust on knowledge-sharing is supported by the experimental study carried out by Wang and Rubenstein-Montano (cited in Coakes, 2003). Statistical analysis shows that as trust level increases, the value of knowledge-sharing increases.

Organizations with 'cultures of pride' find themselves more innovative (Kanter, 1988, p.105). The process of innovation itself needs to be managed not as a linear sequencing of activities but as the integration of knowledge presently distributed among a variety of groups (Scarbrough, 2003, p. 513). The cultural characteristics that shape social interaction are: (1) discussability of sensitive topics, (2) senior management's approachability, (3) frequency of interactions, (4) collective responsibility for problem solving, (5) orientation to existing knowledge and expertise, (6) knowledge-sharing, (7)

teaching, and (8) learning from mistakes (De Long and Fahey, 2000, p.122).

Cultures basically spring from three sources: (1) the beliefs and values of founders of organizations, (2) the learning experiences of group members as their organization evolves, and (3) new beliefs and values brought in by new members and leaders (Schein, 1992, p.221). Based on Edgar Schein's work, subsequent writers have promoted that it is the main task of organizational leaders to develop and actively reinforce *strong* organizational culture (Newell et al., 2002, p.33). Employees do not have to be leaders to win the rewards of heroism. Companies with strong cultures create heroes throughout the corporation. Strong culture is the right culture as it regulates how people are to behave most of the time (Kennedy and Deal, 1982).

In contrast, other authors argue that sometimes strong organizational culture may not be helpful. McShane and Von Glinow offer three explanations. One reason for the weak relationship is that a strong culture increases organizational performance only when the cultural content is appropriate for the organization's environment. When a firm's strong culture is misaligned with its environment, employees have difficulty anticipating and responding to the needs of customers or other dominant stakeholders. A second reason companies with strong cultures are not necessarily more effective is that strong cultures lock decision makers into mental models that blind them to opportunities and unique problems. Finally, very strong cultures tend to suppress dissenting subcultural values, which encourage constructive controversy and more creative thinking about how the organization should interact with its environment (McShane and Von Glinow, 2003, pp.456-457).

A network study of 120 new projects by 41 divisions in a multi-divisional and multinational company shows that weak inter-unit ties help knowledge searching in other subunits but hinder the transfer of complex knowledge, which tends to require a strong tie between the two parties to a transfer. Complex knowledge is typified by non-codified or tacit knowledge. Strong ties are necessitated by strong relationships between people in different organizational subunits that lead to efficient knowledge-sharing, which is positively proportional to culture strength (Hansen, 1999, p.82).

2.3.7 Reward system

The role of rewards is more as an incentive for the exchange of knowledge than for

giving knowledge to a system (Earl, 2001, p.220). Rewards must be granted in a correct context and in a sufficient frequency. Rewarding those who are good at flattering and ignoring those who do really contribute to the requisite knowledge causes discontent and leads to a lack of interest in knowledge-sharing (Abdulai, 2004, p.215).

Research by Laupase (cited in Coakes, 2003) suggests that, with effective implementation, reward systems do encourage personalization. Three case studies conducted in December 2000 on three management consulting firms in Australia conclude that people will share knowledge if they can get something in return, which may be in the form of recognition, praise, advancement, time-off, or money. Later in 2001, interviews conducted in seven international management consulting firms further support the assertion that reward systems motivate consultants to share their tacit knowledge with others. Informal meetings are regarded as highly significant in the socialization process for sharing tacit knowledge through shared experiences. To encourage effective knowledge-sharing, consultants prefer to receive intrinsic rewards, which include appreciation and respect from others, rather than extrinsic rewards (Coakes, 2003).

Based on another survey of sales and marketing managers in 75 pharmaceutical companies in the UK, motivation of sales staff is a key component in the future development and deployment of sales force automation (Donalson and Wright, 2004, p.262). Four key motivators are personal growth, operation autonomy, task achievement and monetary rewards. Survey results show that money was of lowest importance (7 percent). Once the financial rewards have met those prevailing in the industry, the other three motivators, namely personal growth (34 percent), operational autonomy (30 percent), and task achievement (29 percent), should be used as motivators (Tampoe, 1993, p.184).

On the other hand, Bartol and Srivastava argue that knowledge-sharing is influenced by team-based rewards, which can foster cooperation among team members. Similarly, for knowledge-sharing across teams and work units, company-wide incentives such as profit-sharing and employee stock options help in encouraging knowledge-sharing. Employee stock options are particularly likely to encourage individuals to share knowledge that is high in complexity (Bartol and Srivastava, 2002, p.73).

There are a number of different ways to reward performance when teams are involved: first, to reward the individual team members for their performance; secondly, to reward the teams for their performance; thirdly, to reward team performance indirectly by rewarding organizational performance. Additional options can be created by using a combination of the three options (Jackson, Hitt and DeNisi, 2003, p.288). Research reveals that the following reward systems impact positively on the knowledge culture: (1) person-based pay, (2) team bonus, (3) gain-sharing, (4) broad-based profit-sharing, and (5) broad-based ownership. On the other hand, job-based pay and individual merit have negative impacts on an organization's knowledge culture (Jackson, Hitt and DeNisi, 2003, p.299).

Nonetheless, managers are still struggling to find the right incentives or the right mix of incentives to support knowledge-sharing. Preliminary results by Benbya and Belbaly suggest, however, that these motivational factors are context-dependent and, consequently, organizational climate plays a critical role (Benbya and Belbaly, 2005, p.214).

2.3.8 Information and communication technology (ICT)

ICT is the enabler of change, but it does not by itself create transformations in society. ICT is best regarded as the facilitators of knowledge creation in innovative societies. It is not only the driver of change, but also the tool for releasing the creative potential and knowledge embodied in people (Ernst and Young, 1999).

In terms of Binney's spectrum, the KM application for personalization is more in the area of innovation and creation, providing an environment in which knowledge workers from differing disciplines can work together in the creation of new knowledge (Binney, 2001, p.37). IT investment must be in accordance with the strategy of codification or personalization (Bontis, 2001, p.36). Ng and Li advise against investing heavily in ICT if an organization opts for personalization. ICT fits well with codification, in storing descriptive accounts of knowledge for the purpose of reusability (Ng and Li, 2003, p.173). Research reveals a paradox of information supply in competitive information markets: the less information a supplier offers, the more it is used (Hansen and Haas, 2001, p.1).

High-speed digital communications allow designers at different locations to work

concurrently on the same model, with simultaneous video and audio communication (McMahon, Lowe and Culley, 2004, p.312). Offshore drilling knowledge is made available globally at British Petroleum by desktop video conferencing (Alavi and Leidner, 2001, p.121). One popular approach to utilize the firm's intranet strategy in facilitating knowledge-sharing is the corporate knowledge portal, consisting of a browser-based application that allows knowledge workers to gain access to business-related problems (Chan, Zannes and Pace, 2002, p.145). Peer-to-peer networks develop global mind-sets, combining local expertise from various geographical areas around the world (Smith, 2001, p.320), whereby the combination of network connections and relatedness in knowledge content facilitates knowledge transfers and synergies in multi-unit firms (Hansen, 2002, p.232).

ICT transforms the nature of community of practice (COP), which is defined as a group of people bound informally together by shared *expertise* and *passion* for a joint enterprise (Wenger and Snyder, 2000, p.139). It is traditionally regarded as a platform whereby organizational knowledge is created and shared, predominantly through personalization (Carter and Scarbrough, 2001, p.220). Similarly, Langford also considers that knowledge-sharing in a COP is realted to personalization rather than codification (Langford, 2001, p.9). With the progress in ICT, virtual COP can be established for internationally-operating corporations to restore pseudo face-to-face contact via such media as e-mail, phone, and video conferences (Gammelgaard and Ritter, 2005, p.139).

2.3.9 Environment

Several aspects of environment have been identified as important in the literature of knowledge management and organizational learning. These include innovation, experimentation, risk-taking, creativity, an environment of openness, continuous education, acceptance of failure, trust, and a high value on learning. Unfortunately, there have been relatively few empirical studies to test these theoretical propositions (Jackson, Hitt and DeNisi, 2003, p.346).

Knowledge management is vitally important with regard to organizational adaptation, survival and competence, especially when the environment is changing at a rapid pace. Any design of a knowledge management framework or system should ensure that

adaptation and innovation of business performance take place in line with the changing dynamics of the business environment (Lehaney et al., 2004).

KM requires a delicate marriage of technology with environment (Ruddy, 2000, p.37). There are six environmental factors that are positively related to creative work outcomes: positive challenge, freedom, supervisory encouragement, work group supports, organizational encouragement and sufficient resources (Amabile, 1997, p.46). These factors should affect the choice of KM strategy in a very similar manner.

Freedom in deciding what to do and how to do creates a sense of control over one's work. Autonomy leads to responsibility (Drucker, 1999, p.85). There are three key elements: mutual engagement, shared repertoire and joint enterprise. Mutual engagement comes from the interaction of members. By being mutually engaged with one another, knowledge is shared and enacted (Iverson and McPhee, 2002, p.260).

The finding that learning is easier within rather than across boundaries, suggests that there is an issue about the content of knowledge, which leads to the preference for the personalization strategy or community model of KM over the ICT-based approach or codification strategy (Newell, 2004, p.19).

2.4 CHOICE OF KNOWLEDGE MANAGEMENT STRATEGY

Like a double-edged sword, KM strategy can work both ways. It can be an organization's most powerful source of innovation. It can also be an organization's greatest hurdle to organizational change (Ward, 2000, p.6).

2.4.1 Differences among industries

From the research on 92 firms (49 in Europe, 37 in the US, four in Australia and two in Asia) from various industries of telecommunication, computer, health, aerospace, chemical and water, 82 percent of the companies use face-to-face meetings at the beginning of the knowledge-sharing process (Nicolas, 2004, p.28). Service-based organizations often rely on a codification approach in a low-volatility context and a personalization approach in a high-volatility context, while product-based organizations tend to adopt both personalization and codification approaches in a high-volatility context (Kankanhalli, et al., 2003, p.73).

In the manufacturing sector, a questionnaire survey on 70 companies in Australia and New Zealand from both the private and the public sectors reveals that there is a significant and positive relationship between personalization and innovation (Gloet and Terziovski, 2004, p.408). Assemble-to-order product emphasizes codification whereas customized services or products necessitate personalization in terms of person-to-person knowledge-sharing (Smith and Rupp, 2004, p.65). Crisplant, a Danish company whose core business is the development of materials handling systems, emphasizes a personalization strategy where social networks and creativity constitute the core of KM (Skovvang and Bang, 2003, p.127). In product data management, an essential tool for engineers, electronic product development has the feature of understanding and translating customer requirements through personalization (Smith, 2004a, p.515).

Codification strategy is predominant in construction projects, since existing plans need only minor modifications. Drawings, reports, tables and procedures are stored in manual folders and/or computer databases, which can be retrieved by other individuals. On the other hand, the objectives of research and development projects are always vague at the beginning, thus knowledge is mainly shared through direct person-to-person contacts. The role of computers is to help communicate knowledge, not to store it (Koskinen, 2004, p.17).

The study conducted at John F. Kennedy Space Center of National Aeronautics and Space Administration using a survey of 159 individuals and two rounds of personal interviews indicates the preference for codification rather than personalization (Sabherwal and Becerra-Fernandez, 2003, p.247). Boeing took either approach when it considered a KM system, but it selected a codification strategy in preference to a personalization strategy (Szymczak and Walker, 2003, p.134). The US Department of the Navy developed strategies both for codification and for personalization (Reneker and Buntzen, 2000, p.394). The National Health Service in the UK emphasized on the codification of individual and collective knowledge, keeping in mind the needs to be balanced by personalization, especially when dealing with innovative services that rely on tacit knowledge to solve problems (Davies and Nutley, 2000, p.998).

In marketing, both codification and personalization strategies can be adopted for partner relationship management (Leigh and Marshall, 2001, p.91). For sales forecasting, most companies favor a personalization strategy. While not conclusive, analysis suggests that

the equal use of codification and personalization strategies leads to higher satisfaction. Codification strategy enables the application of analytical techniques in establishing a baseline forecast, and personalization strategy introduces intuition and experience. Using both strategies leads to most reasonable intelligence-based forecast (Kahn and Adams, 2000, p.22). The examination of the sales performance of 1,340 sales representatives highlights that the more knowledge documents sales representatives read, the more likely they are to exceed their quota. As codification strategy is designed to provide highly reusable knowledge, the specialized knowledge of the high-performing sales representatives is less likely to be in the sales force automation because the organization is more interested in making available knowledge with high applicability to many users (Ko and Dennis, 2004, p.314).

A case study has been carried out by Al-Shammari (cited in Jennex, 2005, p.258) for a telecommunications firm in Bahrain, aiming at developing an understanding of various aspects and issues related to the implementation of knowledge-enabled customer relationship management. The company seeks to move from an engineering-led organization toward a customer-centric strategy. In doing so, it adopts a mixture of codification and personalization approaches in its KM activities, but the codification strategy prevails over the personalization strategy, based on the three pillars of knowledge: people, process, and technology (Jennex, 2005, p.258).

As far as the software industry is concerned, there is no defined strategy. For *infomediary*, a website that collects and organizes large amounts of data and acts as an intermediary between those who supply the information and those who want the information, codification is the primary task (Whitten and Stephens, 2002, p.53). The same applies to enterprise portal which focuses on codification (Cloete and Snyman, 2003, p.240). Similarly for e-learning, a subset of distance learning, codification strategy is predominant in the delivery of learning materials, packages or content through various forms of electronic media (Kathawala and Wilgen, 2004, p.505). In contrast, focused e-personalization strategy is a key factor for repeat business and overall customer retention in the Internet travel marketplace (Smith, 2004b, p.298). Finally, in software process improvement, a balance between personalization and codification approaches is yet to be found (Mathiassen and Pourkomeylian, 2003, p.78).

2.4.2 Differences among countries

It has been observed that in the US, most knowledge practice focuses on codification; firms measure success by short-term economic returns on knowledge investment. Dow Chemical, for example, focuses on the distribution and use of explicit knowledge, for results that are able to be measured quickly in terms of savings and licensing income. In Japan, on the other hand, there is said to be more focus on personalization in terms of creation of knowledge, with an emphasis on interpersonal exchange of tacit knowledge. Success is measured by a long-term capability to succeed through innovation (Martin, 2000, p.32).

Guillen argues that contemporary Japanese management works within a system of industrial relations that limits the articulation of collective interests by employees. The Japanese organization of the labor process is, therefore, not easily transferable and thus leads to the necessity of codification. Ideas travel from one country to another and become transformed during both codification and implementation. This occurred when western auto manufacturing methods were transferred to Japan after World War II, and when the principles of *lean production* were introduced from Japan to the US and Europe during the 1980s (Guillen, 1994, p.83). In another empirical survey of 290 US and 653 Japanese managers, the Japanese firms perceived more use of formalization than did the US firms. This reflects that codification is common in Japanese firms, as exemplified by formal written documents used to ensure commitment (Dyer and Song, 1997, p.483).

A research conducted on two groups of junior- to middle-level managers, one group of 26 in Australia while the other group of 31 in Hong Kong, suggests that managers in Hong Kong are more inclined to codification compared with their Australian counterparts. Gloet points out that in high context cultures such as Hong Kong, characterized by hierarchical relationships, ascribed status and a tendency toward well-structured formal lines of communication within organizations, managers are more predisposed to codification where the flow of knowledge is more explicit and therefore more readily controlled (Gloet, 2002, p.314).

2.4.3 Hybrid strategy

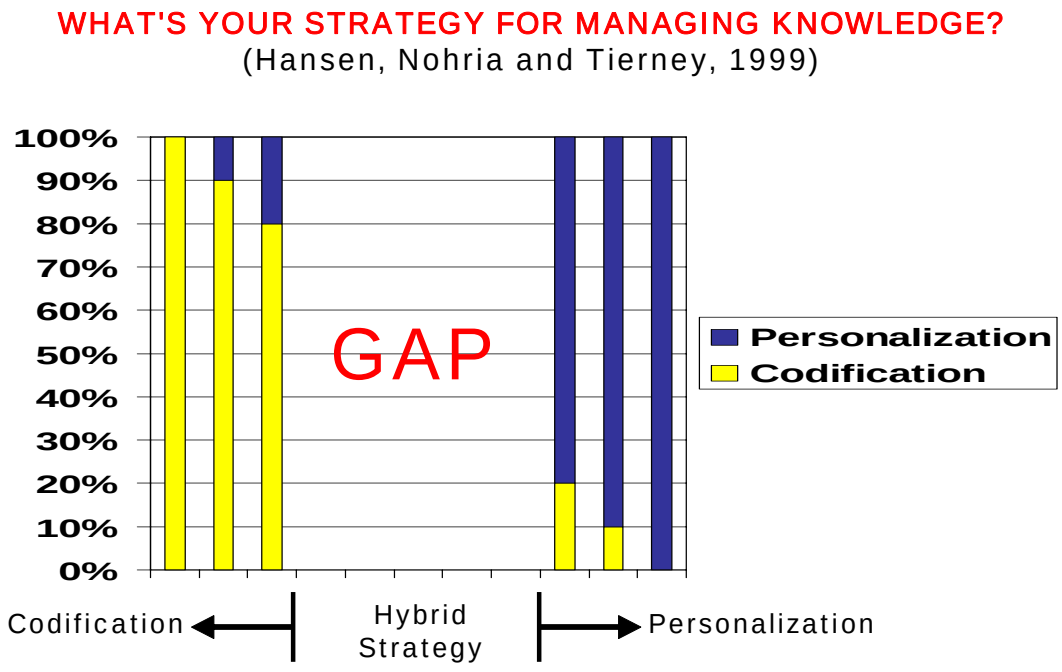
In terms of codification-personalization strategy, HNT recommend companies to pursue

one strategy predominantly and use the second strategy to support the first, based on an 80-20 split: 80 percent follows one strategy and 20 percent the other. Organizations are warned against a dual emphasis on both strategies simultaneously, straddling the two strategies risks failing at both (Hansen, Nohria and Tierney, 1999, p.112).

Consistent with HNT's argument, Bartol and Srivastava highlight that companies tend to emphasize either a codification strategy or a personalization strategy for knowledge-sharing (Bartol and Srivastava, 2002, p.66). Many other authors concur with HNT's proposition that for a KM strategy to be successful, companies must adopt either a codification or a personalization strategy (Bornemann and Sammer, 2003, p.23; Koenig, 2003, p.14; Walters, 2000, p.428).

The business environment has been changing since HNT's categorization of codification and personalization strategies. Technology has been progressing enormously. There exists now a research gap to be bridged between the two extremities (Figure 2.4.3). While HNT suggest that codification and personalization strategies in KM may be mutually exclusive, at times companies have no alternative but to straddle both strategies of codification and personalization and adopt a *hybrid strategy*.

Figure 2.4.3: Gap between codification and personalization



Research by Scheepers, Venkitachalam and Gibbs verifies the existence of such a gap. Using case studies, they examine four organizations representing different combinations of codification and personalization strategies (Scheepers, Venkitachalam and Gibbs, 2004, p.201). They find that it is possible for codification and personalization to be pursued in tandem and suggest that HNT's proposal may be useful during early stages of strategy development, but become less applicable over time (Scheepers, Venkitachalam and Gibbs, 2004, p.217).

By interviewing 11 to 38 employees in each firm's corporate headquarters: an oil equipment services company and two major financial services institutions, Smith discovers that the three organizations have mixed codified and personalized processes (Smith, 2004c, p.15). Another research based on case studies shows that most of the 8 companies surveyed choose a combination of personalization and codification (Torgeir and Reidar, 2002, p.410). A survey carried out in Australia finds 83 percent of the respondents are of the opinion that an organization can use both codification and personalization strategies together (Edwards, et al., 2003, p.52).

A case study at Fuji Zerox provides strong evidence against HNT's argument on mutually exclusive codification or personalization strategies. In reality, the mixture of face-to-face meetings, on-line databases and discussion forums suggests that a hybrid strategy is preferable for KM (Umemoto, Endo and Machado, 2004, p.98).

Personalization or codification alone proves inadequate in clinical practice. Human interaction affects the acceptance of therapeutic interventions even in the most scientific clinical setting. Medicine remains a human science with a strong scientific basis, thus requiring both the codification and personalization domains (Lusignan, Pritchard and Chan, 2002, p.297).

Lowendahl, Revang and Fosstenlokken suggest that professional service firms, for example, engineering, advertising, consulting, accounting and law firms, can successfully operate in mixed modes of codification and personalization. Codification is suitable for information-based knowledge while personalization for experience-based knowledge (Lowendahl, Revang and Fosstenlokken, 2001, p.920).

For design organization, McMahon, Lowe and Culley argue that both personalization and codification are necessary. Activities characteristic of the early stages of new

concept design should not be automated, since they are not sufficiently well understood. On the other hand, if aspects of a design process are well understood then efforts should be made to codify (McMahon, Lowe and Culley, 2004, p.318). Similarly, in Arup, an international design firm, the diversity of its needs has created a demand for both strategies. There is no one correct method since different approaches are appropriate for different units. The KM team initiated several different projects with a view to applying a different mix of tools and techniques in different parts of the firm (Sheehan, 2000, p.13).

Gottschalk and Khandelwal highlight that although there are four stages in the growth model for KM technology (refer Figure 2.3.1), the stages and their sequence are not well defined. For example, if the approach of personalization versus codification strategy is applied, then Stage II of personalization and Stage III of codification may, in fact, represent two alternative stages of growth models (Gottschalk and Khandelwal, 2004, p.121). Similarly, Gloet and Berrell suggest that there is no one best way in the light of codification and personalization strategies. In fact, the key to maximizing the contribution of KM to an established management practice is to find a combination of KM approaches (Gloet and Berrell, 2003, p.86).

Unlike HNT, Taylor suggests that the choice should be determined more by individual user characteristics than those of the product or service. He suggests a balanced approach to accommodate differences in cognitive style and gender (Taylor, 2004, p.62). Maier and Remus urge organizations to move beyond the starter scenario and provide a means that guides the combination of human and technology orientation, in terms of a hybrid codification-personalization strategy, in order to create an organizational environment that individually supports knowledge workers as professionals of varying degrees of expertise (Maier and Remus, 2003, p.73).

2.5 CONCLUSION

Knowledge exhibits specific characteristics that lead to various KM theories. In adopting HNT's codification-personalization strategy, a company must consider the interaction of various determinants.

There is no affirmative answer to the choice of codification-personalization strategy according to the nature of industry, and one cannot conclude any convergence or

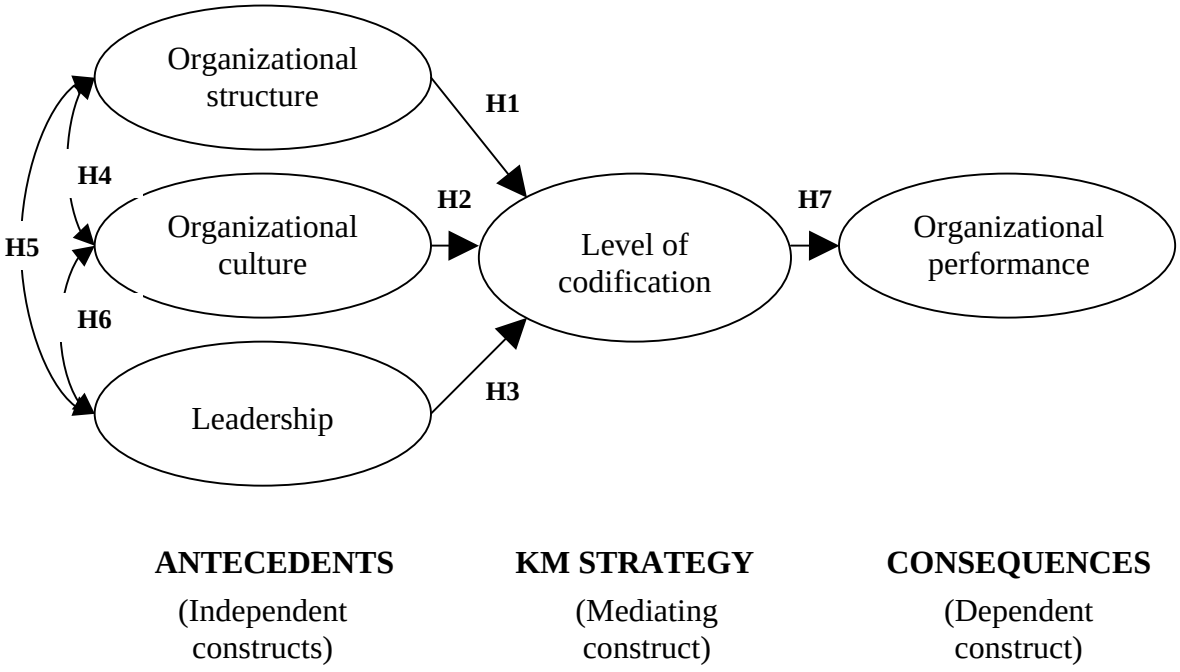
divergence among countries. A hybrid strategy is thus suggested for modern business to address the research gap. In view of limited research in the eastern and western worlds alike, there is a need for further research. Towards this end, the research methodology for further investigation is the subject of the next chapter.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

The research process involves three main stages: pre-research, design and post-design. Pre-research has been carried out in Chapter 2 with information gathering and literature search. From the literature review, determinants of codification-personalization strategy that have been identified are: knowledge life-cycle, organizational structure, firm size, employee characteristics, leadership, organizational culture, reward system, ICT and environment. From these, organizational structure, organizational culture and leadership are three determinants that have been intensively researched in terms of both width and depth, and are thus incorporated in the conceptual framework as shown in Figure 3.1.

Figure 3.1: Conceptual framework of the antecedents and consequences of codification-personalization strategy



3.2 RESEARCH QUESTIONS AND HYPOTHESES

Subsequent to the formalized conceptual framework, the main research questions to be addressed are:

1. **What is the influence of organizational structure, organizational culture and leadership on codification-personalization strategy, and in turn on**

organizational performance?

In addition, within the framework of the research design, two further determinants, knowledge life-cycle and firm size, can be possibly studied with the research question:

2. **What is the influence of knowledge life-cycle and firm size on codification-personalization strategy?**

Previous studies have found no affirmative answer on the choice of codification-personalization strategy according to the nature of industry, and one cannot conclude any convergence or divergence among countries; thus calling for the following research question:

3. **Is the choice of codification-personalization strategy different between local- and foreign-owned companies, and among different sectors?**

Finally, a hybrid strategy has been suggested for modern business to address the research gap. This leads to the final research question:

4. **Does a hybrid strategy, if any, lead to better organizational performance?**

Specifically, twelve related hypotheses have been developed to test whether the relationships that have been theorized do, in fact, hold true.

Hypothesis 1: The higher the extent of organic structure, the lower the level of codification.

Hypothesis 2: The stronger the organizational culture, the lower the level of codification.

Hypothesis 3: The higher the degree of transactional leadership, the higher the level of codification.

Hypothesis 4: The extent of organic structure and the strength of organizational culture are correlated.

Hypothesis 5: The extent of organic structure and the degree of transactional leadership are correlated.

Hypothesis 6: The strength of organizational culture and the degree of transactional

leadership are correlated.

Hypothesis 7: The higher the level of codification, the better the organizational performance.

Hypothesis 8: The further a company progresses along the knowledge life-cycle, the higher the level of codification.

Hypothesis 9: The larger the firm size, the higher the level of codification.

Hypothesis 10: There is no difference in the choice of codification-personalization strategy among various sectors.

Hypothesis 11: There is no difference in the choice of codification-personalization strategy between local- and foreign-owned companies.

Hypothesis 12: Companies that adopt a hybrid strategy perform better.

Having formulated the conceptual framework, research questions and hypotheses, two broad research paradigms are examined before proceeding to discuss the research method adopted by this study, and the development and administration of data collection.

3.3 RESEARCH PARADIGMS & METHODOLOGIES

Research requires an interpretation of reality, and researchers tend to perceive reality in one of two ways. Interpretivists believe that reality comes from shared meaning among people in the environment, while positivists suggest that reality exists independent of people (McShane and Van Glinow, 2003, p.582). Interpretivists attempt to understand a phenomenon from the point of view of the participant, who is directly involved with the phenomenon under study (Eldabi et al., 2002, p.64), whereas positivists prefer deductive and objective research. Table 3.3 summarizes the differences between these two approaches from various philosophical assumptions (Hudson and Ozanne, 1988, p.509).

Table 3.3: A summary of positivist and interpretivist approaches
(adopted from Hudson and Ozanne, 1988, p.509)

Assumptions	*Positivist*	*Interpretivist*
Ontological		
Nature of reality	Objective, tangible	Socially constructed
	Single	Multiple
	Fragmentable	Holistic
	Divisible	Contextual
Nature of social beings	Deterministic	Voluntaristic
	Reactive	Proactive
Axiological		
Overriding goal	Explanation	Understanding
Epistemological		
Knowledge generated	Nomothetic	Idiographic
	Time-free	Time-bound
	Context-independent	Context-dependent
View of causality	Real causes exist	Multiple, simultaneous
Research relationship	Dualism, separation	Interactive, cooperative
	Privileged point of observation	No privileged point of observation

In terms of the ontological paradigm for positivists, the nature of reality is argued to be objective, relying on tangible sense impressions, adhering to strict rules and employing mathematical methods of research which promote an extensive use of statistics (Ali and Birley, 1999; Scandura and Williams, 2000; Spiggle, 1994). On the contrary, the interpretivists believe that reality is socially constructed, multiple, holistic and contextual. While the positivist approach holds that the nature of social beings is deterministic, the interpretivist approach views people as voluntaristic and actively interact in order to shape their environment (Hudson and Ozanne, 1988, p.510).

In an axiological paradigm, the positivists' overriding goal is explanation, compared with understanding for interpretivists (Hudson and Ozanne, 1988, p.510). While the positivists' study is value-free and unbiased, the interpretivists' is value-laden, theory-laden, interpreted and biased (Anderson, 1983; Anderson 1986).

The epistemological assumption in the positivist approach is that the researcher is independent from the subjects, in contrast with the need of interaction with the subjects in the interpretivist approach (Mangan, Lalwani and Gardner, 2004, p.568). The positivists endeavor to identify time- and context-free generalizations, or nomothetic

statements. Conversely, the interpretivists look for subjective experiences that are idiographic, time- and context-bound (Hudson and Ozanne, 1988, p.511; Tsoukas, 1989, p.555).

The rhetorical paradigm for positivists is formal, impersonal, and definition-based, with emphasis on quantitative words. On the other hand, interpretivists' rhetorical paradigm is base on evolving decisions.

Finally, the methodological paradigm of positivism is highly structured, exhibiting a preoccupation with operational definitions, objectivity, replicability, and causality (Bryman, 1984, p.77). This is clearly divergent from the interpretivist approach which is inductive, simultaneous, emerging, and involving patterns and verification (Gephart, 1999). Methodologically, the positivists claim that the data from qualitative research is unsound, based on lack of generalizability of qualitative data and lack of rigor in the research methods (Dean, 2004, p.151).

This study attempts to emphasize facts and predictions, and explain relationships between determinants and consequences of KM strategy. As KM strategy pertaining to codification and personalization is "out there" to be discovered and tested, a positivist paradigm is appropriate. This approach provides the framework for a quantitative study upon which the methodology of this research is based, whereby a number of studies identified during the pre-research stage have effectively adopted the quantitative approach (Donaldson and Wright, 2004; Gloet and Terziovski, 2004; Sabherwal and Becerra-Fernandez, 2003; Dyer and Song, 1997; Edwards, et al., 2003).

3.4 RESEARCH DESIGN

Based on the quantitative methodology of a positivist paradigm, the design stage consists of a number of interactive steps: (1) selecting the data collection method, (2) identifying the measurement technique, (3) sample design, and (4) developing the administrative procedure.

3.4.1 Data collection method

Data for quantitative research can be collected from case study, experiment, structured observation, secondary data analysis, or survey. Despite the argument of Johnson and Onwuegbuzie that differences in epistemological beliefs should not prevent a

quantitative researcher from utilizing data collection methods more typically associated with qualitative research (Johnson and Onwuegbuzie, 2004, p.15), the research problems at hand can be comfortably investigated with pure quantitative approach.

The purpose of this study is not case-specific, therefore the case study research method cannot be used.

Experimental research requires the researcher to manipulate one or more variables in examining the effects on subjects in an assigned group (Grace, 1999, p.42). In order to investigate the adoption of codification-personalization strategy, random assignment of groups and manipulation of variables is not desirable. Moreover, one obvious limitation is that it lacks realism and consequently, the results might be different in the real world. Participants are aware that they are being studied and this awareness causes them to act differently than they normally would (McShane and Van Glinow, 2003, p.587). Therefore, experimental research is ruled out for this study.

In order to carry out a structured observation for 1,180 MSC-status companies in Malaysia, researchers must participate in naturally occurring environment and record observations for each of the companies. This would prove to be physically and financially impossible given a limited time frame. Another problem is that the observer is subject to perceptual screening and organizing biases (McShane and Van Glinow, 2003, p.589). In addition, as constructs of codification-personalization strategy cannot be examined, observational research is not appropriate to answer the questions posed in this study.

For secondary data analysis, researchers use existing databases, information systems, government documents, industrial publications, news sources and published articles to answer research questions or test hypotheses (Castleberry, 2001, p.195; Cowton, 1998, p.424). This method is inappropriate for this research as using data developed for some other purpose is inappropriate for the research problems at hand.

Hence, survey research is selected as an appropriate method of data collection, in terms of practicality and its ability to answer effectively the research questions. Many variables can be studied simultaneously, thereby permitting this study to be carried out in totality (McShane and Van Glinow, 2003, p.588). Among the advantages of survey over other methods of data collection are: (1) allowing contact with otherwise

inaccessible participants, for example CEOs, and (2) enabling expanded geographical coverage without increase in costs (Cooper and Schindler, 2006, p.253).

Time horizon can be either cross-sectional or longitudinal. Although longitudinal research offers more insight into the research, it requires more time and increases costs, leading to the choice of cross-sectional study for this research.

3.4.2 Measurement technique

There are at least five instruments of data collection for a survey: personal interview, personally-administered questionnaire, telephone interview, electronic questionnaire and mail questionnaire. Different instruments have respective strengths and weaknesses.

Personal interviews can establish rapport and motivate respondents, clarify questions, and add new questions. Interviewers can read non-verbal cues and thus obtain rich data. Nonetheless, personal interviews take more time and cost more. Interviewers also need to be trained. In addition, interview error constitutes a confounding factor. Logically, personal interviews achieve higher response rates than telephone or mail surveys and can be used for lengthier and more complex questionnaires (Synodinos, 2003, p.225).

Personally-administered questionnaires have similar advantages to personal interviews. Costs can be reduced when the questionnaires are administered to groups of respondents although organizations may sometimes be reluctant to give up employees' time for this purpose.

This study is restricted by time, and concerns over costs are an important consideration, thus the first two instruments are deemed unsuitable.

In comparison, telephone interviews are speedier and cheaper. However, the disadvantage is that, in the Malaysian context, interviews have to be kept short most of the time, and that respondents tend to terminate the interview at any time. As this study encompasses 1,180 companies as the target population, telephone is not an appropriate means of reaching the targets.

Electronic questionnaire is increasingly popular with the advancements in ICT, since it is the easiest, most convenient, cheapest and speediest instrument, besides having the capability of reaching out globally. Studies have shown that electronic questionnaire is

relatively more effective in eliciting sensitive information from more mistrustful respondents (Wright, Aquilino and Supple, 1998, p.351). However, the unique nature of IP (Internet Protocol) addresses makes it possible in many situations to track which computer – and by extension, which person – has sent a message or engaged in some other activity on the Internet. This information has been used by law enforcement authorities to identify criminal suspects (Wikipedia, 2006). Since an electronic questionnaire may not meet the criterion of anonymity set for this study, this option is ruled out.

Mail questionnaire is the final method under consideration. This method has previously been used in studies relating to this area of study. First, it provides geographical flexibility in terms of access to widely dispersed area. Secondly, it allows time-convenience so that respondents can reply during a time that is convenient to their schedules (Fox, Robinson, and Boardley, 1998, p.128). Thirdly, completing questionnaires is relatively simple and straightforward and does not require an excessive amount of time (McClelland, 1994, p.23). Fourthly, mail questionnaire is a non-invasive method of data collection, whereby the participants are not inconvenienced or exposed unnecessarily to inducement, coercion or harm (The University of Newcastle, 2004, p.7). Finally, mail questionnaire reduces interviewer bias (Greer, Chuchinprakarn, and Seshadri, 2000, p.98). However, it may have the disadvantage of non-response bias, which is characterized by a systematic difference between the final sample and the planned sample, resulted from a low response rate (Fox, Robinson, and Boardley, 1998, p.128).

Having examined the advantages and practicalities of each instrument, it is decided to employ mail questionnaire as the data collection instrument for this study.

3.4.3 Sample design

Sample design involves the steps of defining the population, identifying the unit of analysis, selecting the sampling frame and determining the sample size.

The unit of analysis is *organization* in the industrial population, comprising 1,180 MSC-status companies in Malaysia, which can be drawn from the sampling frame, MSC's official website (www.msc.com.my/cs/company). A complete population of all firms in the list constitutes the sample for this study. MSC-status companies form an

appropriate population as far as KM is concerned, since they are ICT-orientated compared with the rest of the industrial population. The topic of KM strategy is deemed to be of interest to the recipients of questionnaires, thus is likely to generate higher response rate (Greer, Chuchinprakarn, and Seshadri, 2000, p.98).

Industrial populations refer to those respondents who receive questionnaires at their place of employment. Because of factors such as their preoccupation with work, confidentiality of information, or company rules and policies, industrial populations are less likely to respond to survey questionnaires than consumer populations (Greer, Chuchinprakarn, and Seshadri, 2000, p.99). Studies reveal that in Hong Kong the usual postal survey yields a response rate of 20 percent to 40 percent (Lee, 2004, p.98). Lower response rates have been reported in Malaysia for industrial populations. Response to 2005 Management Crisis Survey by Monash University Malaysia from public-listed companies was 5 percent, considered quite low but well within the expected response rate of between 5 percent and 10 percent for such surveys, as commented by Schmidt (Schmidt, 2005). 11 percent (16 out of 140) of responses was received for a survey on standard wage system in the hotel industry (NPC, 2002, p.3), and 14.3 percent for the survey on ICT applications for service industries in Malaysia (NPC, 2000, p.137). Mail survey on purchasing strategy among manufacturing firms in the northern region of Malaysia yielded a response rate of 12 percent (Zalazilah, Pong and Khaw, 2002, p.12).

Comparing with low response rate for general industrial populations, surveys directed to specific industrial populations yield higher response rates. 57 percent (71 out of 124) of companies responded to the mail survey among contractors of Telekom Malaysia Berhad (Chong, 2000). For MSC-status companies, similar to the population used in this study, 667 out of the 716 targeted companies responded to the 5th Impact Survey, equivalent to 93 percent response rate. A high response rate was achieved due to two main reasons: (1) the survey was conducted online via e-mails and followed up by physical face-to-face visit; and (2) the MSC status requires all companies to respond to any request by Multimedia Development Corporation (MDeC) (MSC, 2004, pp.2-3).

In an attempt to improve the response rate, the following techniques recommended by previous study are adopted. Short questionnaires are preferred over long ones, since the most important factor is the content. Privacy and sensitivity of survey questions, color of questionnaire paper, cover letter, incentive in responding, and set-up time to answer

are considered less important. The least important factors in stimulating response participation are follow-up and pre-notification (Greer, Chuchinprakarn, and Seshadri, 2000, p.104).

Having taken the possibility of low response rate into account, the final step is to establish the sample size. There are several approaches to confirm whether the sample size is sufficient: arbitrary approach, conventional approach, cost basis approach, confidence interval approach and statistical analysis approach. Whilst the first three approaches lack the required rigor, confidence interval approach and statistical analysis approach are more suitable for business research. Using the confidence interval approach, a minimum sample size of 96 is found to be sufficient (Cooper and Schindler, 2006, p.435; Dillon, Madden and Firtle, 1994, p.252):

$$n = \frac{z^2 pq}{e^2}$$

Maximum $pq = 0.5 \times 0.5 = 0.25$

Allow for error rate, $e = 10\%$, hence

$$n = \frac{1.96^2 (0.25)}{0.1^2} = 96$$

Based on the statistical analysis approach, a minimum of five subjects per variable is required for factor analysis. The number of variables in the questionnaire is 40, thus a minimum sample size of 200 is required (Coakes, 2005, p.154). This satisfies the minimum sample size of 200 recommended for strategic studies (Dillon, Madden and Firtle, 1994, p.235), and is also within the range of 30 and 500 suggested by Roscoe (cited in Cavana, Delahaye and Sekaran, 2001, p.279). The sample size of 200 necessitates a response rate of 17 percent, which is deemed achievable as the survey is directed to a specific industrial population of 1,180 MSC-status companies. When samples are subdivided into industrial sectors, a minimum sample size of 30 for each category is necessary, according to Roscoe's rule of thumb (cited in Cavana, Delahaye and Sekaran, 2001, p.279).

3.4.4 Questionnaire development and administrative procedure

The questionnaire used in this study (Appendix A) is a product of a systematic process of construction and evaluation. A covering letter signed by the candidate is to accompany each questionnaire. The questionnaires are sent to chief executive officers (CEOs), or equivalent such as managing directors and general managers, because of their knowledge on their firm's strategic situations (Aragon-Correa, 1998, p.558). Although the CEO (or equivalent) is generally viewed as the single individual in an organization who is most qualified to provide valid responses to questions pertaining to organization-level constructs (Conant, Mokwa and Varadarajan, 1990, p.371), the researcher will leave the liberty to the organization to identify an appropriate respondent within the organization. To prevent from being excessively demanding, the questionnaire has 45 items, fewer than 125 items as recommended **(**Sabherwal and Becerra-Fernandez, 2003, p.234), and is estimated to be completed in about 20 minutes.

3.4.5 Construct measurement

It is inappropriate to proceed with theory testing before examining the psychometric properties of the scales developed to measure the key constructs. A construct is defined in conceptual terms but cannot be measured directly (Cavana, Delahaye and Sekaran, 2001, p.34); it is an abstract idea constructed by the researcher that can be linked to observable information (McShane and Van Glinow, 2003, p.583). Therefore a construct has to be operationalized from a conceptual definition to an operational definition, and thus becomes a variable, which is tangible, measurable and physical.

No confidence can be placed in the findings of a study in the absence of an assessment of the psychometric properties of the measures. When importing scales from other disciplines, a researcher's contribution to new knowledge comes from critiquing, updating, refining, extending, and adapting the scales to the KM discipline (Varadarajan, 1996, p.5).

With respect to scaling, Likert scales are the most popular scaling format, followed by semantic differential scales (Albaum and Peterson, 1984, p.167). First, these two types of scale are adopted to leverage on the ability to extract information effectively from respondents, the compatibility with the mail questionnaire instrument of data collection, the ease of construction and administration, and the associated cost effectiveness.

Secondly, these scales have been found to communicate interval properties to the respondents, and therefore produce data that can be assumed to be intervally scaled (Perry, 1998).

The questionnaire comprises three sections. Section A measures the constructs of organizational culture, leadership and organizational performance by means of five-point Likert scales whereas Section B measures the constructs of organizational structure and codification-personalization strategy using seven-point semantic differential scales. Section C collects the required organizational profile by means of categorical scales.

Throughout the questionnaire no negatively-worded items are included. A high proportion of negatively-worded items may result in problems with dimensionality, that is, after factor analysis, false factors may be extracted (Teh, 2002, p.129).

3.4.5.1 Organizational culture

The strength of organizational culture is defined in various ways: as coherence, homogeneity, stability, intensity, congruence, thickness, penetration and internalized control (Gordon and DiTomaso, 1992 p.785). In a 16-year longitudinal study of Standard and Poors 500 companies, culture strength is positively linked with financial performance. Culture strength is also evident in guiding effective action in the absence of defined policies in dealing with crises, as shown in several high-profile cases, for example, when Tylenol, a Johnson & Johnson product, was sabotaged by unknown individuals who placed deadly cyanide in the capsule form of the product in 1982 and again in 1986 (Mallack et al., 2003, p.31).

The measure for culture strength comprises 13 items borrowed from Daft (Daft, 2003, p.98). As cited, Daft's measurement items are developed from Pascale's previous research on corporate culture (Pascale, 1985, p.39). A five-point Likert scale is used. Sekaran highlights that a seven-point scale does not indicate any greater sensitivity compared with a five-point scale; higher-point scales can burden respondents with making distinctions that are too fine (Sekaran, 1983, p.62).

As the reliability of the borrowed scale is not reported, it is investigated in this study. All the 13 items are retained since arbitrarily dropping items from the original scale

may compromise the scale validity. Also, three items are revised to improve understanding in accordance with the local context. First, the word "espoused", which may not be widely understood, is dropped from Item 3 "It is very seldom that a manager will act in a way contrary to the company's espoused values". Secondly, the word "traits" is substituted by "characteristics" for Item 7 "Recruiting is taken very seriously, with multiple interviews in an effort to find traits that fit the culture". Thirdly, in Item 4 "Warmth and support of other employees is a valued norm, even across departments", the term "other employees" is replaced by "co-workers" since the latter is more commonly understood in Malaysia.

A strong culture guides behavior in the absence of policies, procedures and unwritten rules. Culture strength is the result of consistent communication and reinforcement of the organizational culture (Mallack et al., 2003, pp.36-37). Therefore it is hypothesized that organizations with a strong culture will have a high level of personalization.

3.4.5.2 Leadership

Transactional leadership involves managing, while transformational leadership is about leading (McShane and Von Glinow, 2003, p.430). Bartol and Martin argue that transformational leadership is not a substitute for transactional leadership. It is a supplemental form of leadership with an add-on effect. The logic is that even the most successful transformational leaders need transactional skills as well to manage day-to-day events (Bartol and Martin, 1998, p.434). Based on this, the construct of leadership in this research is confined to the transactional aspect of leadership.

The nine-item five-point Likert scale for transactional leadership is borrowed from Hartog, Van Meijen and Koopman. The Cronbach's alpha is 0.79. As advanced by Bass (cited in Hartog, Van Meijen and Koopman, 1997, p.22), three dimensions of transactional leadership are *contingent reward*, *active management-by-exception*, and *passive management-by-exception*. The transactional leadership propounded by Hartog, Van Meijen and Koopman is named *rational-objective leadership*, which is similar to Bass' scale for transactional leadership without passive management-by-exception. (Hartog, Van Meijen and Koopman, 1997, p.30).

3.4.5.3 Organizational performance

The two-item scale for organizational performance in the last portion of Section A is borrowed from Jaworski and Kohli (Jaworski and Kohli, 1993, p.68), rated on a five-point Likert scale ranging from "poor" to "excellent". The reliability of this scale has been reported to be 0.83.

Researchers often encounter problems obtaining objective measures of selected aspects of organizational performance that are reliable and valid. With privately-held firms, such data is frequently unavailable. With conglomerate business units, all or parts of such data is inextricably interwoven with corporate-wide data (Dess and Robinson, 1984, p.265). Subjective perceptions based on managerial assessments are generally quite consistent with objective performance measures internal to the organization (Dess and Robinson, 1984, p.271; Conant, Mokwa and Varadarajan, 1990, p.375), as well as secondary published performance data external to the organization (Venkatraman and Ramanujam, 1986, p.808; Parnell and Wright, 1993, p.31). Given the high correlation found between objective and subjective measures, it can be deduced that the subjective approach is valuable, especially when the available objective measures are not suitable (Cervera, Molla and Sanchez, 1999, p.1274).

The use of subjective measures provides a major advantage over objective ones across firms, industries and other cultures by capturing the perceptions that underlie respondents' decision-making processes. This makes possible the comparison of organizations that differ in size, industry, time horizon, and objectives (Dyer and Song, 1997, p.477).

3.4.5.4 Organizational structure

Organizations tend to cluster around the hierarchical levels, formalization and centralization. As suggested by Hall in 1977 (cited in Frederickson, 1986, p.284), an organization of numerous levels is considered highly complex. Formalization refers to the degree of using rules and procedures to prescribe behavior. Centralization specifies the extent to which the right of decision-making and activity evaluation is concentrated (Frederickson, 1986, pp.283-284).

The organic organizational structure, first identified by Burns and Stalker in 1961 (cited

in Brockman and Morgan, 2003, p.394), is described as highly flexible and informal. Companies with an organic structure have a flat structure with a wide span of control, little formalization and decentralized decision-making (McShane and Von Glinow, 2003, p.514). On the other hand, a mechanistic structure is characterized by a tall structure with a narrow span of control, and a high degree of formalization and centralization.

Organization structure is assessed using a seven-item, seven-point semantic differential scale developed by Khandwalla that has since been used by Covin and Slevin (1989), Naman and Slevin (1993), and Brockman and Morgan (2003). The scale is intended to measure a firm's organicity – that is, the extent to which organizations are structured in an organic versus mechanistic manner. The items assess the following dimensions: access to restricted information, managerial style, employee voice in decision-making, adaptation to changing circumstances, and adherence to formalized procedures and job descriptions. The ratings of the items are averaged to derive a single organicity index for the firm. The higher the index, the more organic the firm's structure; the lower the index, the more mechanistic the structure (Brockman and Morgan, 2003, p.398). Cronbach's alpha has been reported to be 0.80 (Covin and Slevin, 1989, p.79) and 0.827 (Naman and Slevin, 1993, p.143) respectively.

3.4.5.5 Codification-personalization strategy

In the second part of Section B, respondents are asked to indicate their perceptions of their company's KM strategy vis-à-vis emphasis on personalization or codification. This self-reporting approach has been acknowledged as an appropriate method for strategy research (Conant, Mokwa and Varadarajan, 1990, p.372). Based on the original and subsequent literature, the codification-personalization emphasis is identified from the aspects of economic model, KM strategy, IT and human resources (Hansen, Nohria and Tierney, 1999, p.109; Newell et al., 2002, p.74).

No established measurement scale exists to operationalize codification-personalization strategy; thus it is necessary to develop one. One source is from the literature, by converting descriptions into items (Richins and Dawson, 1992, p.308). Nine statements for the comparison of codification and personalization strategies are borrowed from Tiwana (Tiwana, 2002, p.151). The last two of the eleven original questions are omitted.

They are: “What company’s services do your company’s services resemble?”, and “What company’s products do your company’s products resemble?”. Seven-point semantic differential scale is added to the nine borrowed statements, consistent with the scale used for organizational structure. For each question, the descriptions of codification and personalization are given at opposite ends.

The main reason is that the companies cited by Tiwana may not be well-known to the general population in Malaysia, thus it poses difficulty for respondents to correlate their services and products with these firms. Apart from big names like Andersen Consulting, Delta Airlines, Oracle, Pizza Hut, Dell Computer, Microsoft, SAP, America Online, Lotus, IBM, Hewlett-Packard, other names may not be widely known: Rand Corporation, The Gartner Group, ZDNET, People Soft, Baan, Air Touch Cellular, or Intranetics. In addition, a contradiction of KM strategy has been detected for Boeing, a company cited in Item 11. While Tiwana classifies Boeing in the personalization extremity (Tiwana, 2002, p.152), other authors assert that Boeing primarily adopts a codification strategy (Szymczak and Walker, 2003, p.134). Moreover, the KM strategies of the quoted companies may not be reflective of the current situation; they may have shifted along the continuum of codification-personalization strategy since the book was published in 2002.

Consequently, all the five constructs in the conceptual framework are summarized in Table 3.4.5.5.

Table 3.4.5.5: Summary of constructs in the conceptual framework

Construct (operationalization)	Number of items	Cronbach's alpha	Scale	Source
Organizational culture (culture strength)	13	Not available	5-point Likert	Daft, 2003, p.98.
Leadership (degree of transactional leadership)	9	0.79	5-point Likert	Hartog, Van Meijen and Koopman, 1997, p.30.
Organizational structure (organicity)	7	0.827	7-point semantic differential	Naman and Slevin, 1993, p.152.
Codification-personalization strategy	*9 (11)*	Not available	7-point semantic differential	Tiwana, 2002, p.151.
Organizational performance	2	0.83	5-point Likert	Jaworski and Kohli, 1993, p.68.
TOTAL	**40**			

Note: *9 (11)* means that 9 items have been adopted from the original 11 items.

3.4.5.6 Organizational profile

The first question in Section C classifies the responding companies into different sectors. Initially, the classification was based on four sectors in accordance with 5th Impact Survey conducted by MDeC (MSC, 2004, p.6): technology, trading/services, financial, or others. This classification was subsequently changed to six sectors in line with MSC's current classification: creative multimedia, software development, support services, hardware design, Internet-based business, and shared services and outsourcing. The second question asks for major equity ownership, so as to investigate the difference between local- and foreign-owned companies. The third question categorizes the companies into various stages along the S-curve of life-cycle: seed, start-up, growth, pre- and post-listing, and multinational. This categorization is borrowed from 5th Impact Survey conducted by MDeC (MSC, 2004, p.4).

The indicators for "firm size" are annual revenue (Aragon-Correa, 1998, p.560; Liu, 1995, p.60; Weir, 1995, p.29) and number of employees (Aragon-Correa, 1998, p.560;

Cervera, Molla and Sanchez, 1999, p.1273; Cho and Lee, 2004, p.445; Simonin, 1999, p.478). These two indicators are captured in the subsequent two questions. Categorical scales are employed throughout, as it is recommended to use comparative scales or fixed alternative responses for eliciting opinions or numbers, compared with non-comparative scales recommended for open-ended questions when asking respondents for facts (excluding numbers) (Greer, Chuchinprakarn, and Seshadri, 2000, p.97).

3.4.6 Scale evaluation

Three criteria of scale evaluation are generalizability, reliability and validity.

Generalizability refers to the applicability of the research findings in one setting to other settings. It is obvious that the wider the applicability of the solutions generated by the research, the more useful the research is to the users. In other words, the more generalizable the research, the greater its usefulness and value (Cavana, Delahaye and Sekaran, 2001, p.31).

A quantitative study based on a positivist approach faces the problem of induction: a universal statement cannot be verified by a finite number of observations; hence universal laws are unachievable (Hudson and Ozanne, 1988, p.515). In order to increase the generalizability, the sample design has to be developed logically (Cavana, Delahaye and Sekaran, 2001, p.31). This study endeavors to improve the generalizability by using a complete population of all firms in the sampling frame of MSC. Although its generalizability is still restricted, the scientific value remains significant.

Reliability concerns the degree of internal consistency of the measuring instrument (Burnett and Dart, 2000, p.95), commonly measured using Cronbach's alpha. Although a value of 0.8 is targeted (Ward et al., 1998, p.1038), a minimum value of 0.7 will suffice as suggested by Nunnally (cited in Lee, 2004, p.155) and Hair et al. (Hair et al., 1998, p.118).

Deshpande argues that quantitative methodologies emphasize reliability issues, frequently to the exclusion of validity (Deshpande, 1983, p.107). Validity demonstrates how accurately the research model would measure the concepts the research intends to quantify. Validity can be assessed in a variety of ways including asking questions such as "Is there a consensus that my scale measures what it is supposed to measure?", "Does

my measure correlate with others' measures of the same concept?". Answers to these questions provide evidence of the measure's validity (Lee, 2004, p.159). Validity tests consist of face validity, content validity, criterion validity and construct validity.

3.4.6.1 Face validity

The preliminary approach to validity is to determine whether the measure has face validity, and this can be tested by giving the questionnaire to a sample of respondents to gauge their reaction to the items. Subjective agreement among respondents that a scale appears to accurately reflect what it intends to measure constitutes face validity (Lee, 2004, p.159).

3.4.6.2 Content validity

Most researchers do not treat face validity as a sufficient component of validity tests (Cavana, Delahaye and Sekaran, 2001, p.212). While face validity is considered as a minimal index of validity, content validity relies on judgment (Cooper and Schindler, 2006, p.319). First, the content validity of the scales is intuitively but logically determined so that there is general agreement from the literature that the model being tested has measurement items that cover all aspects of the variable being measured. In this light, the construct of codification-personalization strategy has sufficiently high explanatory power since the selection of the construct measurement is based on an extensive review of international literature.

Secondly, content validity can be foregone if the scale is borrowed by reusing questions from previous survey for consistency and validity (Jenkins and Solomonides, 1999, p.79). Since this study uses a combination of borrowed and hypothesized scales, content validity is achieved through expert opinions, based on feedbacks from two experts, one from Australia and one Malaysia, after critiquing each item in terms of its representativeness to the corresponding construct.

3.4.6.3 Construct validity

High Cronbach's alphas may support the reliability of the chosen scales, but not their content, nomological, discriminant, and predictive validities (Varadarajan, 1996, p.5). Factor analysis is thus used to assess the construct validity in terms of convergent validity and discriminant validity. The former indicates the extent to which scores on

one scale correlate with scores on other scales designed to assess the same construct, whereas the latter measures the level to which scores on a scale do not correlate with scores from scales designed to measure different constructs (Cooper and Schindler, 2006, p.320).

3.4.6.4 Criterion validity

Criterion validity consists of predictive and concurrent aspects. As its name implies, predictive validity is achieved if a scale correctly forecasts the outcome of a construct. Therefore, the scale for organizational performance has high predictive validity if companies of high scores for organizational performance in this survey will subsequently perform well in real practice (Neuman, 2006, p.194). To have concurrent validity, a scale must be associated with a preexisting and already accepted scale. In the case of the new scale created for codification-personalization strategy, it should be highly associated with an existing scale for it to be concurrently valid. The two measures may not be perfectly associated, but it is logical for them to yield similar results (Neuman, 2006, p.193).

3.4.7 Ethical issues

It is unethical to conduct research which is methodologically unsound (The University of Newcastle, 2004, p.2). First and foremost, it is important to make sure that sufficient data can be gathered to answer the research questions.

This research on KM strategy has no conflict of interest with the current employment of the researcher who is working as the general manager for a property developer. The participants are from the public domain, and bear no personal relationship to the researcher. There is no commercial or financial interest in proposing the research or in the outcome of the research.

Participants are requested to participate in the survey via a letter of invitation. As the names of all the CEOs of MSC-status companies are legitimately accessible from the public domain, MSC's official website (www.msc.com.my/cs/company), there is no need for organizational consent.

The questionnaire is designed to be anonymous. In a questionnaire survey, participants are willing to contribute their time, effort and goodwill to assist the researcher in

meeting the survey goals. This is considered a privilege, not a right or an expectation. In return, the participants' autonomy has been respected. The return of a completed survey can be taken as voluntary consent (The University of Newcastle, 2004, p.7).

This study is an applied business research on KM and no sensitive questions are asked. No unique identifiable data is being collected from the respondents. Therefore, the question of invasion of privacy is non-existent. Inducement is irrelevant as there are no monetary rewards involved.

In Malaysia, English is a business language; its usage sometimes surpasses the national language, Malay. Despite this, there is no compiled statistics on non-English speaking CEOs. It is a widely accepted fact that all CEOs in Malaysia have a reasonable command of English. Therefore, translation is deemed unnecessary. Even if a CEO is limited in the command of English, there will be other co-workers who are sufficiently competent in English to assist in completing the questionnaire.

Confidentiality is the obligation of the researcher, in order to protect the privacy of the information gathered, and to ensure that it is not used for any purpose other than for the study at hand. As a security measure, all the returned questionnaires will be stored securely in a locked cabinet and the electronic copy of the data will be stored in a computer file with password. Once the data has been analyzed, the study is completed and the dissertation examined, all questionnaires will be destroyed (The University of Newcastle, 2004, p.12).

3.5 CONCLUSION

In the design stage, initially a conceptual framework has been formalized and four research questions have been proposed to address the research gap. Twelve related hypotheses have been formulated in an attempt to test the research questions. The research method used in this study has been selected after a systematic analysis based on quantitative methodology of a positivist paradigm. Following a process of elimination and methodological appropriateness at each step of the research process, survey has been selected as the method of data collection. Mail questionnaire has been selected as the most psychometrically sound measurement instrument to gather information required to test the hypotheses. In sample design, population has been defined, with appropriate unit of analysis, sampling frame and sample size.

Questionnaire development, administrative procedure and scale evaluation have also been presented, taking into consideration ethical issues.

CHAPTER 4: RESEARCH RESULTS

4.1 INTRODUCTION

As stated previously, the research process involves three main stages: pre-research, design and post-design. Having deliberated on the design stage in Chapter 3, this chapter deals with the final stage of post-design. The steps involved are: (1) questionnaire coding, (2) data-entry, (3) data cleaning and editing, (4) profiling, (5) measurement assessment, and (6) inferential statistics.

Ethics approval was obtained from the research ethics committee of the University of Newcastle on 12 April 2006. It took slightly more than two weeks to package the questionnaires, to open a post office box and to apply for business reply service (BRS) with Pos Malaysia, the national postal service.

Out of the 1,180 companies in the sampling frame, 14 companies have their mailing addresses overseas. Since the reply-paid envelopes can only be used within Malaysia, it was decided to exclude these companies from the mailing list. A total of 1,166 questionnaires were sent out on 29 April 2006, requesting them to be returned by 11 May 2006. By 13 May 2006, 82 undelivered questionnaires were returned for two reasons: 71 cases due to company relocation and 11 cases due to recipient's resignation. The number of questionnaires successfully delivered thus became 1,084. By 22 May 2006, a total of 173 responses were received. Realizing that too short a period was allowed for response, postcard reminders were sent out on 16 May 2006 to 1,084 companies to inform on the extension of deadline to 31 May 2006. By 5 June 2006, additional 46 responses were received, thus making the total respondents to be 219. The response rate is 20.2 percent out of the total of 1,084. Table 4.1(a) summarizes the response details.

Table 4.1(a): Response of questionnaire by sector

Sector	Number of companies in the mailing list	Number of respondents by sector	Percentage of response by sector
Creative multimedia	118	17	14.4%
Software development	611	96	15.7%
Support services	99	41	41.4%
Hardware design	118	15	12.7%
Internet-based business	145	14	9.7%
Shared services and outsourcing	75	31	41.3%
Missing		5	
Total	**1166**	**219**	

The use of a questionnaire survey reduces both the time and cost of administration. Expenditure incurred is RM 1,465.20 as detailed in Table 4.1(b), which comprises the printing of questionnaires, envelopes and reminder postcards, as well as mailing costs inclusive of reply-paid postage. Therefore, leveraging on the ease and efficiency of bulk postage, the cost per survey is estimated at RM 1.26.

Table 4.1(b): Expenditure on questionnaire survey

Description	RM
P.O. box annual rental	50.00
P.O. box key deposit	30.00
1200 nos. of 4.2" × 9" envelopes @ RM 0.07 each	84.00
1200 nos. of 4.5" × 9.5" envelopes @ RM 0.07 each	84.00
Photocopy 1200 sets of 3 double-sided questionnaire sheet @ RM 0.08	288.00
Photocopy 1200 sets of reply-paid envelope @ RM 0.03	36.00
Postage for 1166 mails @ RM 0.40	466.40
Printing 1100 sets of reminder postcard @ RM 0.10	110.00
Postage for 1084 reminder postcards @ RM 0.20	216.80
BRS (business reply service) deposit	100.00
Total	**1465.20**

Notes:

1. *RM 1 = AUD 0.36 as on 12 June 2006*
2. *Based on the postage of RM 0.32 for replied questionnaire, the deposit of RM100.00 is sufficient for 313 replies.*

In fact, in anticipation of low response rate of mail questionnaire, BRS is found to be a better alternative for reducing the cost of postage. If stamps were to be pasted on every reply envelope, the cost would become RM 349.80, at RM 0.30 for 1166 envelopes. By making use of the reply-paid service, only the returned replies incur charges with a

service surcharge of RM 0.02 each. By comparison, 219 replies at RM 0.32 cost RM 70.08, which is around 20 percent of the cost of using pre-pasted stamps.

After collecting the 219 questionnaires, the data in the hardcopy is transformed into soft data readable by the SPSS program. Before proceeding with statistical analysis, the data is coded using the SPSS data editor. The questionnaire coding adopted is shown in Appendix B, comprising name, description and measurement scale for all variables involved in this study. The top portion consists of 45 original variables in the questionnaire, whilst the bottom portion comprises 11 derived variables, computed from the original variables. Short variable names in the form of abbreviations are chosen in order to avoid being truncated by the SPSS program. Although it is possible to use letters as data, all data is coded in numeric form. For instance, local-owned companies have been coded as "1" and foreign-owned companies as "2".

The entire data listing is provided in Appendix C. In data-entry, missing data is left blank. In this survey, missing data may be due to three main reasons: (1) participants accidentally skip, (2) participants refuse to answer, or (3) participants do not know the answer to an item in the questionnaire. A two-step process was adopted for handling missing data. First, the pattern of missing data is explored to determine the "mechanism of missingness". Secondly, a missing-data technique is selected (Cooper and Schindler, 2006, p.454).

Exclusion of missing data can be done using pairwise deletion, listwise deletion (Coakes, 2005, p.45), or replacement of missing values with estimated means. Replacement of missing values with estimated means has the disadvantage of reducing the variability in the original data, which can cause bias. Pairwise deletion involves the removal of cases with missing values only on the relevant variables. This can also lead to bias result. Therefore, listwise deletion is adopted wherever possible, whereby cases with a missing value for any variable in the data list are eliminated. Listwise deletion is appropriate because the missing data are MCAR, which is the default option in the SPSS program. MCAR stands for missing completely at random; the probability of missingness for a particular variable is dependent on neither the variable itself nor any other variable in the data set (Cooper and Schindler, 2006, p.455).

4.2 SAMPLE CHARACTERISTICS

Descriptive statistics is used for profiling the sample characteristics. The purpose is to examine and familiarize oneself with the data, for three basic reasons as follows:

1. To see if there are problems in the data such as outliers, non-normal distributions, and problems with coding and errors in data-entry.

2. To examine if any variables have a large amount of missing data, which can be problematic when performing statistics with two or more variables. Also, missing data could indicate that there is a problem in data-entry.

3. To get basic information regarding the patterns of data.

The SPSS outputs give descriptive statistics and histograms with superimposed normal curves for all questionnaire items labeled as scale variables (Appendix D1), nominal variables (Appendix D2) and ordinal variables (Appendix D3). The scale variables include organizational culture, leadership, organizational performance, organizational structure and level of codification. The nominal variables consist of sector and major equity ownership, whereas the ordinal variables comprise current operational status, annual revenue and number of employees.

The variables are list in the left column and the descriptive statistics are list across the top row of the outputs. The requested descriptive statistics are the number of subjects (N), the mean for each variable, the standard deviation, the skewness and the kurtosis, and the minimum and maximum scores. The valid number of subjects is provided at the bottom line of the outputs, whereby they include only those with no missing data on any variable requested in the output. Therefore, there are 186 valid N out of 219 participants for scale variables, and 214 valid N for nominal variables and ordinal variables respectively. Performance item 2 has the worst case of 12 missing data items, thus the valid N becomes 207. There are 16 variables with no missing data at all. They are: organizational culture items 1 to 5, 7 to 10 and 12, leadership items 1 to 4 and 6, and major equity ownership.

The output data is checked for errors. The minimum and maximum are within the appropriate range for each variable: 1 to 5 for organizational culture, leadership and organizational performance; 1 to 7 for organizational structure and codification-

personalization strategy, 1 to 2 for major equity ownership, and 1 to 6 for sector, current operational status, annual revenue and number of employees. For both scale and ordinal variables, all the means seem to be reasonable and fall within the expected ranges. The checking carried out suggests that the data is clean, and no mistake has been made in data coding and entering.

The main assumption to be checked from the output is normality. A simple guideline is that if the skewness is within plus or minus one (Leech, Barrett and Morgan, 2005, p.28), and the kurtosis is within plus or minus 1.96 (Hair et al., 1998, p.73), the variable is at least approximately normal. From Appendix D1, except for organizational culture item 9 which has a skewness of −1.003, which is marginally out of this range, all variables have skewness and kurtosis within the range and thus can assume normality. Anyway, the items will not be used as individual variables because they will be combined to create summated variables before being used for inferential statistics. Given the individual pattern of normality, it will be likely that the normality of the summated variables will be satisfied.

Ordinal variables with five or more levels and skewness values between −1 and +1 behave more like scale variables (Leech, Barrett and Morgan, 2005, p.31). In Appendix D3, the ordinal variables have six levels and skewness values between −1 and +1. They are considered normally distributed; hence inferential statistics that has the assumption of normality can be applied.

4.3 MEASUREMENT ASSESSMENT

In measurement assessment, two essential tests are reliability analysis and factor analysis. It is inappropriate to proceed with theory testing before examining the psychometric properties of the scales developed in measuring the key constructs (Varadarajan, 1996, p.5).

4.3.1 First stage reliability analysis

The reliability analysis procedure provides information about the relationships between individual items in the scale. Using the SPSS program, reliability analysis is performed separately for each of the borrowed and hypothesized scales for the constructs in the conceptual framework. The analysis requires the elimination of some items from each

scale to maximize Cronbach's alpha.

4.3.1.1 Cronbach's alpha for organizational culture

In Appendix D4, Cronbach's alpha is calculated for organizational culture. The first table provides the case processing summary. Reviewing the descriptive statistics in Appendix D1, organizational culture items 6 and 13 have one missing data item respectively and organizational culture item 11 has two. The total three missing data items reduce the valid number of subjects from 219 to 216.

The second table of reliability statistics indicates that Cronbach's alpha (based on unstandardardized items) is 0.840, whereas Cronbach's alpha based on standardardized items is higher by 2 basis points at 0.842. The values are higher than the minimum recommended value of 0.7 (Hair et al., 1998, p.118). In general, standardized alpha is adopted when the items in the scale have quite different means and standard deviations. From observation of the third table, it can be found that the items in the scale have quite similar means and standard deviations. Therefore, Cronbach's alpha (based on unstandardardized items) is applicable here.

The next table is a matrix showing the inter-item correlations of every item in the scale with every other item. A higher value suggests higher correlation among items. This is followed by the table giving the mean, minimum, maximum, range and variance of the item means and of the inter-item correlations. The penultimate table shows the summary of descriptive statistics for the scale as sum of the thirteen organizational culture items. The mean of 49.06 is the average for the 13-item summated scale score for 216 subjects.

The last table of item-total statistics provides five pieces of information for each item in the scale. The two most useful are the 'Corrected Item-Total Correlation' and the 'Cronbach's Alpha if Item Deleted'. The former is the correlation of each specific item with the summated scale score. The last column indicates what the Cronbach's alpha would be if an item is deleted. Deleting item 12 improves the alpha to 0.843. Deleting a poor item makes the alpha go up, but it only makes a small difference in the alpha because Cronbach's alpha is based on the number of items as well as their average inter-correlations.

Cronbach's alpha greater than 0.90 means that the scale items are probably repetitious or that there are more items in the scale than are really necessary for a reliable measure

of the construct. This does not happen here, as Cronbach's alpha of 0.840 is smaller than 0.90. If the corrected item-total correlation is moderately high or high, say 0.40 or above, the item is probably at least moderately correlated with most of the other items and will make a good component of this summated scale. Items with lower item-total correlations do not fit into this scale psychometrically. If the item-total correlation is negative or too low (less than 0.30), it is wise to modify or delete such items (Leech, Barrett and Morgan, 2005, p.67). Since the item-total correlation for item 12 is less than 0.30 at 0.276, this item can be deleted from the scale.

4.3.1.2 Cronbach's alpha for leadership

Cronbach's alpha is examined for leadership in Appendix D5. The table of reliability statistics indicates that Cronbach's alpha (based on unstandardardized items) is 0.812, whereas Cronbach's alpha based on standardardized items is higher by 3 basis points at 0.815. From observation of the third table, it can be found that the items in the scale have quite similar means and standard deviations. Therefore, Cronbach's alpha (based on unstandardardized items) is applicable here.

The mean of 31.98 is the average for the 9-item summated scale score for 216 subjects. From the last table of item-total statistics, no items in the corrected item-total correlation column has a value lower than 0.30. The last column indicates that none of items can be deleted to increase the reliability measure. This is to be expected from such a well-established scale.

4.3.1.3 Cronbach's alpha for organizational performance

In Appendix D6, Cronbach's alpha is calculated for the construct of organizational performance. Reviewing the descriptive statistics in Appendix D1, performance item 1 has 10 missing data items and performance item 2 has 12. This accounts for the valid number of subjects of 207 out of 219.

The table of reliability statistics indicates that Cronbach's alpha based on unstandardardized items and based on standardardized items are both 0.826. The mean of 7.17 is the average for the 2-item summated scale score for 207 subjects. From the last table of item-total statistics, no items in the corrected item-total correlation column has a value lower than 0.30. The last column indicates that none of the items in the 2-item scale can be deleted.

4.3.1.4 Cronbach's alpha for organizational structure

Cronbach's alpha is assessed for organizational structure in Appendix D7. The table of reliability statistics indicates that Cronbach's alpha (based on unstandardardized items) is 0.846, whereas Cronbach's alpha based on standardardized items is higher by 1 basis point at 0.847. From observation of the third table, it can be found that items 1 to 4 in the scale have quite different means from items 5 to 7. Therefore, Cronbach's alpha of 0.847 based on standardardized items is applicable here.

The mean of 29.83 is the average for the seven-item summated scale score for 212 subjects. From the last table of item-total statistics, no items in the corrected item-total correlation column has a value lower than 0.30. The last column indicates that none of items can be deleted to increase the reliability measure. This is to be expected from such a well-established scale.

4.3.1.5 Cronbach's alpha for level of codification

Cronbach's alpha is calculated for level of codification in Appendix D8. The table of reliability statistics indicates that Cronbach's alpha (based on unstandardardized items) is 0.567, whereas Cronbach's alpha based on standardardized items is higher by 1 basis point at 0.568. From observation of the third table, it can be found that items 6 and 7 in the scale have quite different means from the remaining items. Therefore, Cronbach's alpha of 0.568 based on standardardized items is applicable here. The mean of 36.99 is the average for the 9-item summated scale score for 205 subjects.

From the last table of item-total statistics, except for items 2, 7 and 8, all other items in the corrected item-total correlation column has a value lower than 0.30. The last column indicates that none of items can be deleted to increase the reliability measure. The low Cronbach's alpha of 0.568 indicates that the multi-item scale for level of codification has insufficient internal consistency. This is to be expected from a scale which has not been tested previously.

Subsequent attempts are undertaken to remove some items in order to improve the extent to which the different items are consistent with one another, as well as the extent to which each measure is free from measurement error. First of all, item LC9 is deleted since its corrected item-total correlation value is the lowest at 0.157. With regard to

item LC9, it seems that team structure demographics are not a factor in influencing the level of codification.

The result from Appendix D9 shows that Cronbach's alpha based on standardardized items maintains at 0.568 after removing item LC9 from the scale. To investigate the likelihood of improvement in reliability, item LC1 is selected as the next item to be removed as its corrected item-total correlation of 0.176 is the lowest among the remaining items.

From Appendix D10, Cronbach's alpha based on standardardized items remains at 0.568 after removing item LC1 from the scale. To investigate the likelihood of improvement of reliability, item LC5 is selected as the next item to be removed as its corrected item-total correlation of 0.213 is the lowest among the remaining items.

Appendix D11 shows that Cronbach's alpha based on standardardized items drops to 0.559, after the elimination of item LC5 from the scale. Item LC4 is selected as the next item to be deleted since its corrected item-total correlation of 0.188 is the lowest among the remaining items.

The result in Appendix D12 indicates that Cronbach's alpha based on standardardized items increases to 0.561 after the removal of item LC5 from the scale. Item LC7 with a corrected item-total correlation of 0.266 is selected as the next item to be removed.

Appendix D13 gives a lower Cronbach's alpha based on standardardized items of 0.532. Item LC6 is selected as the next item to be deleted since its corrected item-total correlation of 0.208 is the lowest among the remaining items.

In Appendix D14, Cronbach's alpha based on standardardized items improves to 0.553 for the remaining items in the scale, LC2, LC3 and LC8. Item LC8 is selected as the next item to be deleted since its corrected item-total correlation of 0.305 is the lowest among the remaining items.

Appendix D15 shows a lower Cronbach's alpha based on standardardized items of 0.546. As the scale has been reduced to two items, further item removal is not possible.

From all the trial runs carried out, the highest reliability is 0.568, where all items in the scale are taken together (Appendix D8).

4.3.2 Factor analysis

Construct validity is ensured through factor analysis, which examines inter-relationships among the items and identifies clusters of items that are closely linked together. It aids in the identification of a theoretically developed construct (Lee, 2004, p.163).

In factor analysis, there are two ways to represent a large number of relationships among scale variables in a more parsimonious way: exploratory factor analysis (EFA) and principal components analysis (PCA). Both methods enable the determination of a fairly large set of items which 'hang together' as a group. A related approach, confirmatory factor analysis (CFA), requires other computer software and is thus is not used in this research. The conceptual difference between EFA and PCA is that in EFA, it is postulated that there is a smaller set of unobserved variables or constructs that underlie the variables actually observed or measured; whereas in PCA the purpose is simply trying to determine mathematically a relatively small number of variables used to convey as much of the information in the observed variables as possible (Leech, Barrett and Morgan, 2005, p.76).

Since this analysis attempts to use fewer variables to provide the same information that one would obtain from a larger set of variables, rather than to understand the relations among variables by understanding the constructs that underlie them, PCA is adopted instead of EFA.

To make the output more understandable, rotation is usually necessary to facilitate the interpretation of factors. Unrotated solutions are hard to interpret because variables tend to load on multiple factors. The sum of eigenvalues is not affected by rotation, but rotation will alter the eigenvalues of particular factors. There are several methods of rotation: varimax, direct oblimin rotation, quartimax rotation and equimax rotation (Coakes, 2005, p.157).

According to Trochim (cited in Lee, 2004), varimax rotation is an orthogonal rotation of the factor axes to maximize the variance of the squared loadings of a factor (column) on all the variables (rows) in a factor matrix. That is, it minimizes the number of variables which have high loadings on any one given factor. Each factor will tend to have either large or small loadings of particular variables on it. A varimax solution yields results which enable easy identification of each variable with a single factor (Lee, 2004, p.166).

Due to its advantages over other methods, varimax rotation is adopted in this study.

Various approaches have been advocated with regard to criteria of deciding the variable loading on a particular factor. This is purely arbitrary, but this research uses a cut-off of 0.3 for factor loading, which is common in social science practice.

The subsequent step in factor analysis involves determining how many factors to interpret and then assigning a label to these factors. The number of factors to be interpreted largely depends on the underlying purpose of the analysis, and can be determined from the output and confirmed by the scree plot.

4.3.2.1 PCA on all scale variables

In Appendix D16, the first table provides the descriptive statistics for each variable, including mean and standard deviation. Due to missing data and the adoption of listwise deletion, the valid number of subjects N for all scale variables is 186. This is lower that the recommended sample size for factor analysis of $40 \times 5 = 200$.

The next table gives the results of Kaiser-Meyer-Olkin (KMO) test and Bartlett's test. KMO measure should be greater than 0.70, and is inadequate if less than 0.50. The KMO test indicates whether or not enough items are predicted by each factor. The Bartlett's test should be significant so that the variables are correlated highly enough to provide a reasonable basis for factor analysis (Leech, Barrett and Morgan, 2005, p.82). In this analysis, the KMO measure is 0.772 and the Bartlett's test is significant. Therefore, both requirements are satisfied. Although the valid number of subjects N of 186 is slightly lower that the recommended sample size of 200, the KMO measure of 0.772 compensates the data insufficiency in achieving the required power for this factor analysis.

The subsequent table displays the communality of the items. Item OC1 has the lowest communality of 0.491. Communalities are estimates of the common variance among the variables. Factors resulting from common factor analysis are based only on the common variance (Hair et al., 1998, p.102). This means that 49 percent of the variance in item OC1 is explained by the factors being studied (Cooper and Schindler, 2006, p.706).

The table of "total variance explained" shows how the variance is divided among the 40 possible factors. 11 factors have eigenvalues (measures of explained variance) greater

than 1.0, which is a common criterion for a factor to be useful. When the eigenvalue is less than 1.0, this means that the factor explains less information than a single item would have explained. After rotation, the first factor accounts for 12.1 percent of the variance, the second factor accounts for 9.8 percent, and the third factor accounts for 8.0 percent. The fourth to eleventh factors account for 6.1 percent, 5.0 percent, 4.3 percent, 4.3 percent, 3.8 percent, 3.6 percent, 3.2 percent and 3.2 percent respectively.

Both the scree plot and the eigenvalues support the conclusion that the 40 variables can be reduced to seven main components. Note that the scree plot flattens out after the seventh component.

Next is the unrotated component matrix, which should not be interpreted. This table is only useful for computing only one variable that provides the most information about the set of variables.

This is followed by a rotated component matrix, which contains the loadings for each component. Based on varimax rotation, the final factors will be as uncorrelated as possible with each other. As a result, the information explained by one factor is independent of the information in other factors. Rotation enables different items to be explained by different underlying factors, and each factor explains more than one item (Leech, Barrett and Morgan, 2005, p.82).

The SPSS program sorts the 40 items into 11 overlapping groups of items, each of which has a loading of absolute value |0.30| or higher. Actually, every item has some loading from every factor, but there are blanks in the matrix where weights less than |0.30| are suppressed.

Loadings from an orthogonal rotation are correlation coefficients of each item with the factor, so they range from –1.0 through 0 to + 1.0. A negative loading indicates a reverse-scored item. Although reverse-scored items have not been used in the questionnaire, surprisingly there exist three negative loadings, which may be due to negative correlation of the items with their respective factors.

Within each factor, the items are sorted from the one with the highest loading to the one with the lowest. Every item has a loading from every factor, but in a clean factor analysis almost all of the loadings that are less than |0.30| in the table of rotated

component matrix are low. Items OC5, OC2, OC6, OC9, OC1, OC10, OC8, OC7, OC4, OC3, L9, L6, L3 and OS1 in that order have high loadings for component 1, and items OS5, OS7, OS6, OS4, OS2, OS1 and OS3 in that order have high loadings for component 2.

Finally, the component plot illustrates a visual representation of the loadings, plotted in space. The plot shows how the items are related to each other and to the components.

Factor analysis on 40 variables taken together may give results that are too complex for the extraction of valuable conclusions. It is therefore decided to break down the factor analysis into two parts, one consisting of all independent variables, and the other comprising mediating and dependent variables. This is carried out in the subsequent two analyses.

4.3.2.2 PCA on independent variables

In Appendix D17, the first table provides the descriptive statistics for each variable, including mean and standard deviation. Due to missing data and the adoption of listwise deletion, the valid number of subjects N for all scale variables is 206, which exceeds the recommended sample size for factor analysis of $40 \times 5 = 200$.

In the next table, the KMO measure is 0.831, which is greater than 0.5, and the Bartlett's test is significant. Therefore, both requirements are satisfied.

The subsequent table displays the communality of the items. Item L2 has the highest communality at 0.777, whereas item OC8 has the lowest communality of 0.404. This means that 78 percent of the variance in item L2 and 40 percent of the variance in item OC8 are explained by the factors respectively.

The table of "total variance explained" shows how the variance is divided among the 29 possible factors. Seven factors have eigenvalues greater than 1.0, which is a common criterion for a factor to be useful. When the eigenvalue is less than 1.0, this means that the factor explains less information than a single item would have explained. After rotation, the first and second factors account for 16.1 percent of the variance respectively, the third factor accounts for 13.0 percent, the fourth factor accounts for 10.8 percent, and the fifth to seventh factors account for 8.2 percent, 5.2 percent and 4.5 percent respectively.

Both the scree plot and the eigenvalues support the conclusion that the 29 variables can be reduced to seven components. Note that the scree plot flattens out after the fifth component.

Next is an unrotated component matrix, which should not be interpreted. This is followed by a rotated component matrix, which contains the loadings for each component. The SPSS program has sorted the 29 items into six overlapping groups of items, each of which has a loading of absolute value |0.30| or higher. Although reverse-scored items have not been used in the questionnaire, there exist two negative loadings, which may be due to negative correlation of the items with their respective factors. Items OC2, OC5, OC6, OC9, OC1, OC10, OC4, OC7, OC8, L9, OC3, L6, and L3 in that order have high loadings for component 1, and items OS5, OS7, OS6, OS4, OS1, OS2 and OS3 in that order have high loadings for component 2. The first two components are very much similar to those for all scale variables taken together, as done in Appendix D16.

Finally, the component plot illustrates a visual representation of the loadings, plotted in space. The plot shows how the items are related to each other and to the components.

4.3.2.3 PCA on mediating and dependent variables

In Appendix D18, the first table provides the descriptive statistics for each variable, including mean and standard deviation. Due to missing data and the adoption of listwise deletion, the valid number of subjects N for all scale variables is 194. This is lower that the recommended sample size for factor analysis of $40 \times 5 = 200$.

In the next table, the KMO measure is 0.601, which is greater than 0.5, and the Bartlett's test is significant. Therefore, both requirements are satisfied. Although the valid number of subjects N of 194 is slightly lower that the recommended sample size of 200, the KMO measure of 0.601 compensates the data insufficiency in achieving the required power for this factor analysis.

The subsequent table displays the communality of the items. Item LC1 has the lowest communality of 0.353. This means that 35 percent of the variance in item LC1 is explained by the factors being studied.

The table of "total variance explained" shows how the variance is divided among the 11

possible factors. Four factors have eigenvalues greater than 1.0, which is a common criterion for a factor to be useful. When the eigenvalue is less than 1.0, this means that the factor explains less information than a single item would have explained. After rotation, the first factor accounts for 17.8 percent of the variance, the second factor accounts for 14.5 percent, the third factor accounts for 13.3 percent, and the fourth factor 12.5 percent.

Both the scree plot and the eigenvalues support the conclusion that the 11 variables can be reduced to four components. Note that the scree plot flattens out after the fourth component.

Next is an unrotated component matrix, which should not be interpreted. This is followed by a rotated component matrix, which contains the loadings for each component. The SPSS program has sorted the 11 items into four overlapping groups of items, each of which has a loading of absolute value |0.30| or higher. No negative loading exists, which is a natural result given that reverse-score items have not been used in the questionnaire. Items P1 and P2 in that order have high loadings for component 1, and items LC2, LC3, LC1 and LC8 in that order have high loadings for component 2.

By examining the content of the items that have high loadings for component 2, it is found that items LC1, LC2, LC3 and LC8 fit together conceptually. Item LC1 asks “What type of business do you think your company is in?”. Item LC2 enquires on the costing model used for products and services. Item LC3 is “What are your company’s typical profit margins?”, whereas item LC8 relates to company’s economies of scale. The fact that they all have strong loadings from the same factor provides some support or their being conceptualized as pertaining to the same construct. Nonetheless, the conceptualization is more inclined towards company’s economic model, rather than knowledge management strategy per se.

For component 3, items LC5, LC4 and LC8 have high loadings in descending order. By examining the content of the items, it is found that these three items fit together conceptually. Item LC4 is about the role of IT in company’s work processes, while item LC5 relates to the reuseability of old material as part of new projects. The fact that they all have strong loadings from the same factor provides some support for their being

conceptualized as pertaining to the same construct vis-à-vis knowledge management strategy.

For component 4, items LC7, LC6 and LC9 have high loadings in descending order. By examining the content of the items, it is found that these three items fit together conceptually. Item LC6 is about reward structure. Right-hand side of the description reads "Employees are rewarded for using and contributing to databases such as Notes discussion databases". Item LC7 concerns how knowledge is exchanged and transferred. Its right-hand side mentions "Employees refer to a document or best practices database that stores, distributes, and collects codified knowledge". Item LC9 concerns employees again, and is related to typical team structure demographics. Being conceptualized to the same construct related to human resource, it is not surprising that they all have strong loadings from the same factor.

Finally, the component plot illustrates a visual representation of the loadings, plotted in space. The plot shows how the items are related to each other and to the components.

4.3.3 Second stage reliability analysis

Having completed factor analysis, reliability analysis is again performed to investigate the Cronbach's alphas associated with different combinations of scale items. Reliability analysis and factor analysis are complementary procedures in scale construction and definition (Coakes, 2005, p.164).

4.3.3.1 Cronbach's alpha for organizational culture

Factor analysis carried out in Appendix D17 produces ten items in component 1, OC1 to OC10, for organizational culture. In Appendix D19, Cronbach's alpha for the ten items is 0.846, which is higher than the alpha obtained in the first stage reliability analysis from the scale where all items are taken together, at 0.842. Therefore, the combination of ten items from OC1 to OC10 will be adopted for inferential statistics.

4.3.3.2 Cronbach's alpha for leadership

In Appendix D20, Cronbach's alpha for the six items in component 3 produced by the factor analysis in Appendix D17, L4 to L9, is 0.822, which is higher than the alpha obtained in the first stage reliability analysis from the scale where all items are taken

together, at 0.812. Appendix D21 yields a Cronbach's alpha of 0.784 for the three items in component 4, L1 to L3. This is lower than the alpha for the combination of six items in component 3. Therefore, the combination of six items from L4 to L9 will be adopted for inferential statistics.

4.3.3.3 Cronbach's alpha for organizational structure

From component 2 of the output of factor analysis in Appendix D17, the high loadings suggest that all items in organizational structure should be used, fully in accordance with the result of the first stage reliability analysis.

4.3.3.4 Cronbach's alpha for level of codification

For level of codification, factor analysis carried out in Appendix D18 produces three items in component 2, LC1, LC2 and LC3, four items in component 3, LC4, LC5, LC8 and LC9, and four items in component 4, LC4, LC6, LC7 and LC9. Appendix D22 generates a Cronbach's alpha of 0.420 for the three items in component 2. In Appendix D23, Cronbach's alpha for the three items of LC4, LC5 and LC8 in component 3 is 0.449. Appendix D24 yields a Cronbach's alpha of 0.295 for the combination of three items in component 4, LC6, LC7 and LC9. Finally, Appendix D25 indicates that Cronbach's alpha for another combination of three items in component 4, LC4, LC7 and LC9, is 0.412.

From all the trial runs carried out in the first stage and second stage analyses, the highest Cronbach's alpha still comes from the scale where all items are taken together, at 0.568. Nevertheless, the value of 0.568 is still lower than the generally agreed upon lower limit of 0.7 (Hair et al., 1998, p.118) but exceeds 0.5, the threshold recommended by Nunnally for exploratory research (cited in Chee and Peng, 1996, p.109).

Is it true that the seven-point semantic differential scale developed for level of codification, by converting nine statements borrowed from Tiwana, fails to be a reliable scale in terms of internal consistency in operationalizing codification-personalization strategy? In order to investigate whether the low reliability is due to the lack of internal consistency, or due to some other reason, reliability analysis is repeated separately for local- and foreign-owned companies. Cronbach's alpha for local-owned companies is found to be 0.513 (Appendix D26) while for foreign-owned companies, Cronbach's

alpha is 0.734 (Appendix D27).

As far as organizational performance is concerned, no alternative combination of scale items is possible for a two-item scale. The maximum values of Cronbach's alpha for all the constructs under study are summarized in Table 4.3.3.4.

Table 4.3.3.4: Summary of reliability analysis

Construct	Maximum Cronbach's alpha	Items included
Organizational culture	0.846	OC1 to OC10
Organizational structure	0.847	OS1 to OS7
Leadership	0.822	L4 to L9
Level of codification	0.734	LC1 to LC9
Organizational performance	0.826	P1 and P2

4.4 INFERENTIAL STATISTICS

Multiple regression is used to answer the first seven hypotheses:

Hypothesis 1: The higher the extent of organic structure, the lower the level of codification.

Hypothesis 2: The stronger the organizational culture, the lower the level of codification.

Hypothesis 3: The higher the degree of transactional leadership, the higher the level of codification.

Hypothesis 4: The extent of organic structure and the strength of organizational culture are correlated.

Hypothesis 5: The extent of organic structure and the degree of transactional leadership are correlated.

Hypothesis 6: The strength of organizational culture and the degree of transactional leadership are correlated.

Hypothesis 7: The higher the level of codification, the better the organizational performance.

In the first stage, the three antecedents, organizational structure, organizational culture and leadership, are the independent variables, with level of codification as the dependent variable. In the second stage, the three antecedents together with level of codification act as the independent variables, and organizational performance becomes the dependent variable.

As illustrated in Figure 4.4 below, the regression equation is expressed in generic term as:

$$Y = b_0 + (b_1)(X_1) + (b_2)(X_2) + (b_3)(X_3)$$

$$Z = b_0 + (b_1)(X_1) + (b_2)(X_2) + (b_3)(X_3) + (b_4)(Y)$$

where,

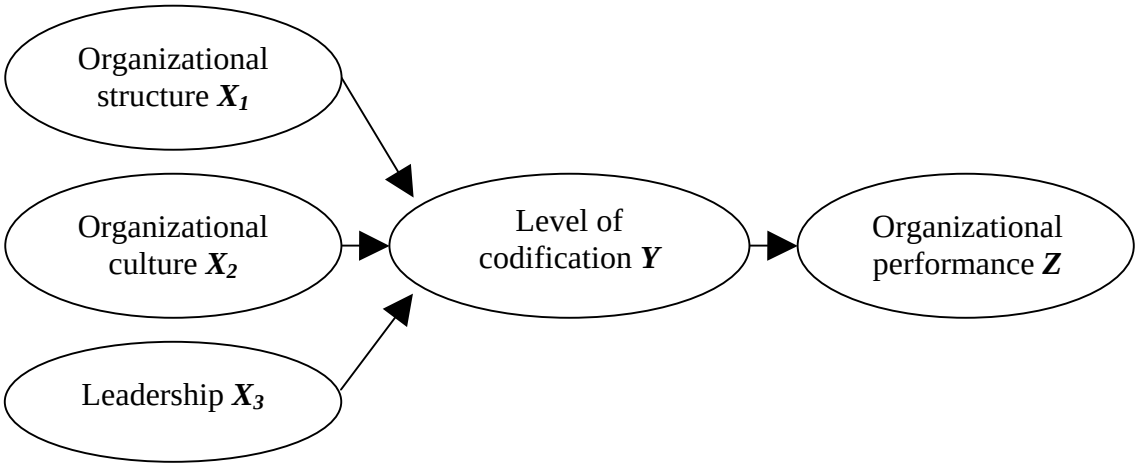
Y or Z = dependent variable,

X_i and Y = independent variable,

b_0 = intercept, and

b_i = regression coefficient.

Figure 4.4: Conceptual framework – operationalization of constructs into variables



There are many assumptions to consider for multiple regression. The first assumption underpins the use of regression is multicollinearity. The correlations between the

independent variables are checked to see if there are any multicollinearity problems. This is done using the bivariate correlations with the option of listwise deletion, in accordance with the missing-data treatment of MCAR. The result is shown in Appendix D28.

The result indicates large correlations between organizational structure and organizational culture (0.201) and between organizational culture and leadership (0.370). The correlations are significant at the 0.01 level.

The second assumption relates the ratio of cases to independent variables. For simultaneous or hierarchical regression, it is ideal to have 20 times more cases than predictors (4×20 = 80) although the minimum requirement is to have at least five times more cases than independent variables (4×5 = 20) (Coakes, 2005, p.169).

4.4.1 Simultaneous multiple regression

First, a simultaneous multiple regression is carried out. All independent variables enter the regression equation at once, in order to examine the relationship between the entire set of independent and dependent variables. The output is given in Appendix D29.

The first table displays the usual descriptive statistics for all four variables. The number of subjects N is 196 because 23 subjects have missing data. Multiple regression uses only the subjects with complete data for all variables. With regard to the assumption of the ratio of cases to independent variables, N of 196 surpasses the ideal requirement of twenty times (4×20 = 80).

The next table is a correlation matrix. The first column shows the correlations of the independent variables with level of codification. Organizational structure, organizational culture and leadership are all uncorrelated with level of codification, having a Pearson Correlation of less than 0.25. As observed, organizational culture and leadership are highly correlated with each other (0.373), whereas organizational structure and organizational culture are moderately correlated with each other (0.216).

According to Cohen (cited in Leech, Barrett and Morgan, 2005, p.56), correlation coefficient R exceeding 0.7 is described as very large, R between 0.51 and 0.7 is considered large, R between 0.36 and 0.51 is medium, and R below 0.36 is low.

The table of model summary shows that R is 0.132 (R^2 = 0.017) and the adjusted R^2 is 0.002, meaning that 0.2 percent of the variance in level of codification can be predicted from organizational structure, organizational culture and leadership combined. It is also found that the adjusted R^2 is lower than the unadjusted R^2. This is partly related to the number of variables in the equation. The adjustment is also affected by the magnitude of the effect and the sample size.

The ANOVA table shows that F = 1.135, p = 0.336, which is insignificant at 95 percent level of confidence. This indicates that the combination of the independent variables is unable to predict level of codification.

In the coefficients table, the "t" value and the "Sig." opposite each independent variable indicate whether that variable is significantly contributing to the equation for predicting level of codification from the whole set of independent variables. Thus, from the table, none of the independent variables is significant.

The regression equation becomes:

LC = 39.124 + 0.88 OS – 0.106 OC – 0.040 L

In addition, the tolerances in the coefficients table suggest the existence of multicollinearity. Tolerance and VIF generate the same information, whereby tolerance = 1/VIF. If the tolerance value is low (less than $1–R^2$), then there is probably a problem with multicollinearity (Leech, Barrett and Morgan, 2005, p.95). In this case, since the adjusted R^2 is 0.002, therefore tolerance is 0.998. Since the tolerance for each of these variables is less than 0.998, the result indicates that overlapping exists between the independent variables.

4.4.2 Hierarchical multiple linear regression

In the second stage, hierarchical multiple regression is adopted, whereby the order of entry of the independent variables is based on theoretical knowledge (Coakes, 2005, p.168). In this way, it is possible to ascertain how prediction by certain variables improves on prediction by others (Leech, Barrett and Morgan, 2005, p.91).

The results are given in Appendix D30. A scatterplot matrix is first created for investigating the assumption of linear relationships of each independent variable with

the dependent variable. The multiple bivariate scatterplots displays the relationships among several variables. Each "O" represents a data point. There are ten bivariate scatterplots in the output.

The clusters of "Os" can be examined for the assumption of linearity. If a straight line can be drawn so that most of the "Os" lie relatively close to it, the two variables are related in a linear fashion. If the "Os" are not in any order or if they appear to be spread out in a cloud, there is no relationship between the variables. If a scatterplot shows little relationship between two independent variables, this means that there is little chance of collinearity involving these variables. If it relates an independent variable and a dependent variable, it means that the independent variable is unlikely to contribute much to predicting the dependent variable.

From observation, straight lines could be drawn for the scatterplots of L-OC, P-OC, P-L and P-LC, indicating that some relationship between them may exist. The remaining scatterplots look more like clouds, suggesting that there is no relationship between the variables. None of the clusters appears to be creating a curve, instead of a straight line. It can be assumed that curvilinear relationship is non-existent.

The table of descriptive statistics shows that the number of subjects N is 187, along with means and standard deviations of all variables in this analysis. From the next table of correlation matrix, organizational culture and leadership are significantly contributing to organizational performance; Pearson Correlations are greater than 0.25. Likewise, the relationship between organizational culture and leadership is high with a Pearson Correlation of 0.381, whereas organizational structure and organizational culture are moderately correlated with each other (0.219).

The table of model summary exhibits R of 0.388 and adjusted R^2 of 0.132. Thus, this model is predicting 13 percent of the variance in organizational performance. Comparing this model with that in Appendix D29, the adjusted R^2 in this model explains more of the variance in the dependent variable. Recall that R between 0.36 and 0.51 is medium in effect according to Cohen. Cohen's medium size effect is "…visible to the naked eye. That is, in the course of normal experiences, one would become aware of an average difference in IQ between clerical and semi-skilled worker…" (Leech, Barrett and Morgan, 2005, p.56).

As can be seen from the ANOVA table, this model significantly predicts organizational performance, $F(4, 182) = 8.05$, $p < 0.001$.

It can be seen from the coefficients table that organizational culture and leadership are significantly contributing to the equation (see the "Sig." column). The next important part of the output is the tolerance and VIF values in the coefficients table for the existence of multicollinearity. In this case, since adjusted R^2 is 0.132, therefore tolerance is 0.868. The tolerances for organizational culture and leadership are less than 0.868, thus the results indicate that overlapping exists between these two independent variables. This existence of multicollinearity is consistent with the result derived from the simultaneous multiple regression in Appendix D29.

The beta weights of 0.241 for organizational culture and 0.201 for leadership suggest that strong organizational culture and high degree of transactional leadership contribute most to predicting organizational performance, whereas organicity and level of codification are insignificant in predicting organizational performance.

The regression equation becomes:

$$P = 3.624 – 0.018\ LC + 0.005\ OS + 0.065\ OC + 0.080\ L$$

Finally, by examining the residual scatterplots, one outlier can be detected. This has negligible impact on the regression solution and is maintained in the data set to avoid the generation of further outliers.

Hypothesis 8: The further a company progresses along the knowledge life-cycle, the higher the level of codification.

Hypothesis 9: The larger the firm size, the higher the level of codification.

The full range of methods used to analyze one continuous dependent variable and one or more independent variables, either continuous or categorical, are mathematically similar (Leech, Barrett and Morgan, 2005, p.52). Similar to the multiple regression performed on scale variables, multiple regression is carried out for ordinal variables. A simultaneous model has been adopted and the SPSS output is displayed in Appendix D31.

The first table displays the usual descriptive statistics for three independent variables: current operational status, annual revenue and number of employees, and the dependent variable: level of codification. The number of subjects N is 200 because 19 subjects have missing data. With regard to the assumption of the ratio of cases to independent variables, N of 200 surpasses the ideal requirement of twenty times (4×20 = 80).

The next table is a correlation matrix. The first column shows the correlations of the independent variables with level of codification. Current operational status, annual revenue and number of employees are all uncorrelated with level of codification. As observed, all the three independent variables are highly correlated with each other; that is, current operational status and annual revenue (0.542), current operational status and number of employees (0.603), and annual revenue and number of employees (0.646).

The table of model summary shows that R is 0.112 (R^2 = 0.013) and adjusted R^2 is 0.003, meaning that 0.3 percent of the variance in level of codification can be predicted from current operational status, annual revenue and number of employees combined. It is also found that the adjusted R^2 is lower than the unadjusted R^2.

The ANOVA table shows that F = 0.830, p = 0.479, which is insignificant at 95 percent level of confidence. This indicates that the combination of the independent variables is unable to predict level of codification.

In the coefficients table, the “t” value and the “Sig.” opposite each independent variable indicate whether that variable is significantly contributing to the equation for predicting level of codification from the whole set of independent variables. Thus, from the table, none of the independent variables is significant.

The regression equation becomes:

LC = 37.76 + 0.14 COS + 0.24 AR – 0.64 NOE

where,

COS = current operational status,

AR = annual revenue, and

NOE = number of employees.

In addition, the tolerances in the coefficients table suggest the existence of multicollinearity. The adjusted R^2 is 0.003, therefore tolerance is 0.997. Since the tolerance for each of these variables is less than 0.997, the result shows that overlapping exists between the independent variables. One way to handle multicollinearity is to combine variables that are highly related if it makes conceptual sense. This is carried out in the following analysis.

In Appendix D32, annual revenue and number of employees are combined by taking the average of the two variables. The construct firm size is then derived. It makes conceptual sense because the two variables are highly related, having a Pearson Correlation of 0.646.

The next table of descriptive statistics shows that the number of subjects N is 200, along with means and standard deviations of all variables in this analysis. With regard to the assumption of the ratio of cases to independent variables, N of 200 surpasses the ideal requirement of twenty times ($4 \times 20 = 80$).

The next table is a correlation matrix. The first column shows that the independent variables are all uncorrelated with level of codification, having Pearson Correlations of less than 0.25. As observed, current operational status and firm size are highly correlated with each other (0.633).

The table of model summary shows that R is 0.078 ($R^2 = 0.006$) and adjusted R^2 is – 0.004, meaning that level of codification cannot be predicted from current operational status and firm size combined.

The ANOVA table shows that $F = 0.599$, $p = 0.550$, which is insignificant at 95 percent level of confidence. This indicates that the combination of the independent variables is unable to predict level of codification.

In the coefficients table, the “t” value and the “Sig.” opposite each independent variable indicate whether that variable is significantly contributing to the equation for predicting level of codification from the whole set of independent variables. Thus, from the table, none of the independent variables is significant.

The regression equation becomes:

LC = 37.88 + 0.10 COS – 0.44 FS

where,

COS = current operational status, and

FS = firm size.

In addition, the tolerances in the coefficients table suggest the existence of multicollinearity. In this case, since the adjusted R^2 is –0.004, therefore tolerance is 1, the maximum value. Since the tolerance for each of these variables at 0.600 is less than 1, the result shows that multicollinearity exists.

Hypothesis 10: There is no difference in the choice of codification-personalization strategy among various sectors.

One-way analysis of variance (ANOVA) is appropriate to compare the means of more than two groups of an independent variable. The term "one-way" is relevant when the design has only one independent variable (Leech, Barrett and Morgan, 2005, p.47).

H_0 = there is no difference in the choice of codification-personalization strategy among various sectors.

H_1 = at least 2 of the means are statistically different.

In running an ANOVA, it is necessary that the assumptions of normality and homogeneity of variance are met. Normality is first checked as done in Appendix D33. In reviewing the descriptive statistics, skewness for level of codification is less than 1. Kurtosis at 0.976 is also smaller that the threshold value of 1.96 for normality. Therefore, the assumption of normality is satisfied.

As observed from the histogram, the shape of the distribution is considered normal. Closely related to the histogram are the stem-and-leaf plot and the box plot. These plots provide more information about the actual values in the distribution than does the histogram. From observation, the shape of the distribution of the stem-and-leaf plot is deemed normal. For the box plot, the median is positioned near to the centre of the box, indicating that the distribution is normal.

Next, in the normal Q-Q plot, each observed value is paired with its expected value from the normal distribution. The cases fall more or less in a straight line, thus the sample is from a normal distribution. It is also possible to see the actual deviations of the points from a straight line from the detrended normal Q-Q plot. Since there is no pattern to the clustering of points, and the points do assemble around a horizontal line through zero, the sample distribution is considered normal.

Formal statistical tests for assessing normality are the Kolmogorov-Smirnov test with a Lilliefors significance level, and the Shapiro-Wilk test when the sample size is less than 100. From the last table of tests of normality, the significance level for level of codification using the Kolmogorov-Smirnov test with a Lilliefors significance level is smaller than 0.05, $p = 0.001$, for a valid sample size of 205 subjects. Normality is violated using this statistical test.

There are two reasons why the Kruskal-Wallis test, which is the nonparametric counterpart of ANOVA, has to be performed. First, in case the sample size of any sector falls below 30, a nonparametric statistical test has to be used (Lee, 2004, p.104). Out of the six sectors, four of them have sample size of below 30. Creative multimedia has a sample size of 15, hardware design has 14, Internet-based business 14, and shared services and outsourcing 28. Secondly, the assumption of normality has been violated using the Kolmogorov-Smirnov test, as shown above.

The result of the Kruskal-Wallis test is shown in Appendix D34. The chi-square value of 0.059 for 5 degree of freedom, which has been corrected for ties, $X^2 (2, \underline{N} = 200) = 10.66$, is insignificant at 95 percent level of confidence, but is significant at 90 percent level of confidence.

Since the statistical significance is marginal, a parametric test is also performed to compare the results with that of the nonparametric test. There are three reasons why parametric tests can still be adopted for this analysis. First, nonparametric tests tend to be less powerful than their parametric counterparts (Coakes, 2005, p.204). Secondly, parametric tests such as t-test and ANOVA are robust to one or more of their assumptions. They are robust in the sense that the assumption of normality can be violated without damaging the validity of the statistics (Leech, Barrett and Morgan, 2005, p.28). Thirdly, in most cases the Kolmogorov-Smirnov test and the Shapiro-Wilk

test result in rejection of the null hypothesis and consequently, are of limited use in practice (Mendenhall and Sincich, 2003, p.634).

The result of the parametric ANOVA is given in Appendix D35. Levene's test is used to determine the homogeneity of variance (Coakes, 2005, p.85). It has a significance of 0.246, which is greater than 0.05. Therefore, it can be assumed that the population variances for each group are relatively equal.

From the ANOVA output, significance can be determined by looking at the F-probability value. Given that $F(5, 194) = 2.983$, $p < 0.05$, the significant F-ratio using the degree of freedom (5, 194) at 0.013 is significant at 95 percent significance level, there is statistical evidence to reject the null hypothesis, and that level of codification does significantly differ across the six sectors of MSC-status companies.

Having obtained a significant result, the Tukey HSD test is used as a post-hoc analysis to determine where the significance lies (Coakes, 2005, p.88). It can be found that creative multimedia sector has significantly lower level of codification (30.73) compared with the sectors of software development (37.53), Internet-based business (39.43), and shared services and outsourcing (37.57). The significances are less than 0.05, at 0.008, 0.013 and 0.031 respectively.

Hypothesis 11: There is no difference in the choice of codification-personalization strategy between local- and foreign-owned companies.

First, the null hypothesis and alternative hypothesis are postulated as:

H_0 = there is no difference in the choice of codification-personalization strategy between local- and foreign-owned companies.

H_1 = there is significant difference in the choice of codification-personalization strategy between local- and foreign-owned companies.

As subjects appear in only one group and the two groups are unrelated, an independent groups t-test is appropriate for this analysis. Because of different subjects in each group, normality must first be checked separately for each set of scores, as carried out in Appendix D36. In reviewing the descriptive statistics, it is clear that there is violation to the assumption of normality for LC (foreign). Skewness of LC (foreign) at –1.010 is

slightly more than 1. Kurtosis at 2.205 is also higher that the threshold value of 1.96 for normality.

As observed from the histogram, the shape of the distribution for LC (local) is considered normal, but is negatively skewed for LC (foreign). Closely related to the histogram are the stem-and-leaf plot and the box plot. The stem-and-leaf plot shows violation of normality for LC (foreign), but the observation is unclear from the box plot.

Next, in the normal Q-Q plot, LC (foreign) cases do not fall more or less in a straight line. As shown in the detrended normal Q-Q plot for LC (foreign), the points do not assemble around a horizontal line through zero, suggesting violation of normality.

From the last table of tests of normality in Appendix D36, the significance level for LC (local) using the Kolmogorov-Smirnov test with a Lilliefors significance level is smaller than 0.05, $p = 0.023$. Meanwhile, the significance level of LC (foreign) from the Shapiro-Wilk test is also smaller than 0.05, $p = 0.033$. Normality is violated using these formal statistical tests; hence nonparametric statistical test need to be used.

The Mann-Whitney U test, which is the nonparametric equivalent of the independent groups t-test, is performed in Appendix D37. The output indicates that the result, with correction for ties and Z-score conversion, $Z = -1.950$, $p = 0.051$, is insignificant at 95 percent level of confidence, but is significant at 90 percent level of confidence.

Since the statistical significance is marginal, a parametric test is also performed to compare the results with those from the nonparametric test, again based on the three reasons stated earlier.

The result of the parametric t-test is given in Appendix D38. Levene's test is used to check the assumption of homogeneity of variance. Given that Levene's Test has a significance of 0.386, which is greater than 0.05, it can be assumed that the population variances are relatively equal.

The two-tailed significance of 0.041 for level of codification assuming equal variances indicates that $p < 0.05$ and thus is significant at 95 percent significance level. There is statistical evidence to reject the null hypothesis. Therefore there is significant difference in level of codification, $t(203) = 0.041$, $p < 0.05$, between local-owned (mean = 37.44) and foreign-owned (mean = 34.67) companies. Level of codification for local-owned

companies is significantly higher than foreign-owned companies.

Hypothesis 12: Companies that adopt a hybrid strategy perform better.

First, the companies are divided into two groups; one group of companies adopting either a codification or a personalization strategy, and the remaining is categorized in the group of companies adopting a hybrid strategy. The maximum score for nine items on the seven-point semantic differential scale is 63 (9×7). Scores less than 21 are classified as personalization strategy, scores between 22 and 42 as hybrid strategy and scores above 43 as codification strategy. Similar categorization has been adopted by Brockman and Morgan (2003, pp.402-403) in measuring organicity.

The null hypothesis and alternative hypothesis are postulated as:

H_0 = There is no difference in organizational performance between companies adopting a hybrid strategy and companies adopting either a codification or a personalization strategy; $\mu_{HY} = \mu_{PC.}$

H_1 = Organizational performance is higher for companies adopting a hybrid strategy than those adopting either a codification or a personalization strategy; $\mu_{HY} > \mu_{PC.}$

As subjects appear in only one group and the two groups are unrelated, an independent groups t-test is appropriate for this analysis. Because of different subjects in each condition, normality must first be checked separately for each set of scores, as carried out in Appendix D39. The two groups are represented by PPC (performance for personalization or codification strategy) and PHY (performance for hybrid strategy). In reviewing the descriptive statistics, it is clear that there is no violation to the assumption of normality. For both PPC and PHY, skewness is less than 1, and kurtosis is less that the threshold value of 1.96 for normality.

As observed from the histograms, the shapes of the distribution for both groups are considered normal. Closely related to the histogram are the stem-and-leaf plots and the box plots. The stem-and-leaf plots show normality for PPC, but violation of normality for PHY. The same result can be observed from the box plot for PHY, whereby the median is close to the top of the box, indicating a negatively-skewed distribution.

Next, in the normal Q-Q plot, both cases fall more or less in a straight line. As shown in the detrended normal Q-Q plot for both PPC and PHY, the points do not assemble around a horizontal line through zero, suggesting violation of normality.

From the last table of tests of normality, the significance level for PHY using the Kolmogorov-Smirnov test with a Lilliefors significance level is smaller than 0.05, $p = 0.000$. Meanwhile, the significance level of PPC from the Shapiro-Wilk test is also smaller than 0.05, $p = 0.039$. Normality is violated using these formal statistical tests; hence nonparametric statistical test need to be used.

The Mann-Whitney U test is performed in Appendix D40. The output indicates that the result, with correction for ties and Z-score conversion, $Z = -1.449$, $p = 0.147$, is insignificant at 90 percent level of confidence.

The result is checked using the parametric t-test, as carried out in Appendix D41. Levene's test is used to check the assumption of homogeneity of variance. Given that Levene's Test has a significance of 0.421, which is greater than 0.05, it can be assumed that the population variances are relatively equal.

The two-tailed significance of 0.161 for organizational performance assuming equal variances, $p > 0.05$, is insignificant. There is no statistical evidence to reject the null hypothesis. Therefore, there is no significant difference in the overall organizational performance between companies adopting a hybrid strategy (mean = 7.29) and companies adopting either a codification or a personalization strategy (mean = 6.87).

4.5 CONCLUSION

From the mail survey, 219 questionnaires have been successfully collected. After questionnaire coding and data-entry using the SPSS program, the collected data has been subjected to editing and cleaning during the process of profiling by means of descriptive statistics. In measurement assessment, reliability analysis in terms of Cronbach's alpha and factor analysis have been utilized. Maximum Cronbach's alphas have been established: 0.846 for ten items of organizational culture (OC1 to OC10), 0.847 for seven items of organizational structure (OS1 to OS7), 0.822 for six items of leadership (L4 to L9), 0.826 for two items of organizational performance (P1 and P2), and 0.734 for nine items of level of codification for foreign-owned companies.

Various techniques of inferential statistics, including simultaneous and hierarchical multiple regressions, t-test, ANOVA, and their nonparametric counterparts of Mann-Whitney U test and Kruskal-Wallis test, have been applied for the purpose of testing whether the hypotheses do, in fact, hold true.

It has been found that the extent of organic structure, the strength of organizational culture, and the degree of transactional leadership do not contribute to level of codification. Similarly, level of codification does not contribute to organizational performance. Statistically, the strength of organizational culture and the degree of transactional leadership are highly correlated, the extent of organic structure and the strength of organizational culture are moderately correlated, whereas the degree of transactional leadership and the extent of organic structure are uncorrelated. While level of codification does not contribute to organizational performance, a strong organizational culture and a high degree of transactional leadership contribute positively to organizational performance, whereas organicity is insignificant in predicting organizational performance.

Meanwhile, there is no statistical evidence to show that the further a company progresses along the knowledge life-cycle, the higher the level of codification; neither does firm size contribute to level of codification. However, knowledge life-cycle and firm size are highly correlated with each other.

The level of codification significantly differs across the six sectors of MSC-status companies. It has been found that the creative multimedia sector has significant lower level of codification compared with the sectors of software development, Internet-based business, and shared services and outsourcing.

There is a difference in the choice of codification-personalization strategy between local- and foreign-owned companies, whereby the level of codification for local-owned companies is significantly higher than foreign-owned companies.

Companies adopting a hybrid strategy have higher organizational performance than companies adopting either a codification or a personalization strategy, but the difference is not statistically significant.

CHAPTER 5: CONCLUSIONS

5.1 INTRODUCTION

Perry's jigsaw puzzle analogy suggests that research commences like a jumbled jigsaw puzzle about the research problem. The literature review in Chapter 2 starts to put the pieces together to reveal part of the picture, but the entire picture cannot be identified due to some missing pieces. Chapters 3 and 4 describe the meticulous search for the missing pieces. Finally, this chapter returns to the puzzle to explain how the new pieces fit in to make the entire picture clear (Perry, 1998).

5.2 DISCUSSION OF FINDINGS

This section deals with the four research questions posed in Chapter 1. When drawing conclusions, references will be made both to the literature incorporated within Chapter 2, and to the research findings presented in Chapter 4. Based on the findings from the quantitative analyses, some of the following statements confirm existing research and arguments that were discussed in Chapter 2.

5.2.1 Research question 1

What is the influence of organizational structure, organizational culture and leadership on codification-personalization strategy, and in turn on organizational performance?

In addressing the first research question, the research findings are discussed with respect to the seven associated hypotheses.

Hypothesis 1: The higher the extent of organic structure, the lower the level of codification.

While Bedian (1983), Child, (1988) and Wood (1998) all identify organizational structure as an important factor in determining organizational performance (cited in Connell, 1999, p.360), the analytical result demonstrates that the extent of organic structure does not contribute to level of codification. Therefore, Wang and Ahmad's argument, that an organic structure is preferred to a mechanistic one for personalization strategy, is not supported (Wang and Ahmed, 2003, p.55). Similarly, there is no evidence to show that top-down hierarchical structures are inappropriate for

personalization (Narasimha, 2000, p.132).

The result also rebuts widespread agreements that organizational structure can have a profound impact on strategy through its direct effect on the strategic decision-making process (Frederickson, 1986, p.280). Rather, it tends to support the structure-follows-strategy approach propounded by the noted business historian, Alfred Chandler, that most companies generally follow a pattern of strategy development and then structural change (Bartol and Martin, 1998, p.285).

Hypothesis 2: The stronger the organizational culture, the lower the level of codification.

A strong culture guides behavior in the absence of policies, procedures and unwritten rules. Culture strength is the result of consistent communication and reinforcement of the organizational culture (Mallack et al., 2003, pp.36-37). Nevertheless there is no statistical evidence to support the hypothesis that organizations with a strong culture will have a high level of personalization.

Hypothesis 3: The higher the degree of transactional leadership, the higher the level of codification.

Analytical findings show that the degree of transactional leadership does not contribute to level of codification. Therefore, there is no evidence that leadership is linked to organizational strategy, as argued by Peters and Waterman in 1982, Purcell in 1987, and Viljoen in 1996 (cited in Connell, 1999, p.365).

The second dimension of transactional leadership, *active management-by-exception*, as advanced by Bass (cited in Senior, 2002, p.234) fails to be a valid determinant for codification-personalization strategy in predicting that the leader in the active form searches for deviations, rather than waiting for problems to materialize in order to conform to a high level of codification.

The explanation of insignificance of the degree of transactional leadership in contributing to codification-personalization strategy has been offered by Nissen. This may be an indication that one size does not fit all in terms of knowledge management (Gupta and Sharma, 2004).

Hypothesis 4: The extent of organic structure and the strength of organizational culture are correlated.

The analysis concludes that the extent of organic structure and the strength of organizational culture are moderately correlated. This result is consistent with the view of organizational structure as a representation of organizational culture in much of the existing literature, for example Kennedy and Deal in 1982, Kakabadse et al., in 1988 and Bijlsma-Frankema in 1997 (cited in Connell, 1999, p.360).

Hypothesis 5: The extent of organic structure and the degree of transactional leadership are correlated.

The extent of organic structure and the degree of transactional leadership are uncorrelated. This finding is logical since it provides support that transactional leadership and organicity do not go hand in hand.

Hypothesis 6: The strength of organizational culture and the degree of transactional leadership are correlated.

Statistically, the strength of organizational culture and the degree of transactional leadership are highly correlated. The finding supports the contention that one of the factors that affect management behavior and an organization's informal culture is leadership, according to Kotter and Heskett's (1992) model (Connell, 1999, p.372).

Hypothesis 7: The higher the level of codification, the better the organizational performance.

While level of codification does not contribute to organizational performance, a strong organizational culture and a high degree of transactional leadership contribute positively to organizational performance, whereas organicity is insignificant in predicting organizational performance.

The result is consistent with a case study on Infosys Technologies. As an offshore software service provider based in Bangalore, the IT hub of India, Infosys demonstrates that the adoption of strong leadership and strong culture led to the company's revenue growth from US$9.5 million in 1994 to US$753.8 million in 2003 (Jennex, 2005, p.308).

The finding that a strong culture will improve the organizational performance is consistent with previous studies by Peters and Waterman in 1982, Kanter in 1983 (cited in Senior, 2002, p.160), Denison in 1990 and Gordon and DiTomaso in 1992 (Gordon and DiTomaso, 1992, p.793), that culture strength is predictive of organizational performance. The result is also consistent with that of a 16-year longitudinal study of Standard and Poors 500 companies that culture strength was positively linked with financial performance (Mallack et al., 2003, p.31).

The significance of transactional leadership in contributing positively to the organizational performance is supported by previous research carried out by Hofstede on more than 100,000 IBM employees in 50 countries throughout the world. Malaysia has been found to exhibit the highest power distance (Hofstede, 1983, p.82; McShane and Von Glinow, 2003, p.102). As power distance is the extent to which people accept unequal distribution of power in society, in a country with high power distance like Malaysia, it is logical that transactional leadership has a positive contribution to organizational performance.

The insignificance of organicity in predicting organizational performance is supported by some studies which show that an organic structure is not always helpful. Cooper and Kleinschmidt recommend a more formalized structure for new product development. Mintzberg emphasizes how the organic structure of adhocracy is unnatural in a simple, stable environment. Menon and Varadarajan find that decentralized structures are detrimental (Brockman and Morgan, 2003, p.396). The result of the questionnaire survey on 323 firms in the US suggests that a more moderate organizational structure may be better than either the mechanistic or organic form (Brockman and Morgan, 2003, p.403).

5.2.2 Research question 2

What is the influence of knowledge life-cycle and firm size on codification-personalization strategy?

Hypothesis 8: The further a company progresses along the knowledge life-cycle, the higher the level of codification.

Hypothesis 9: The larger the firm size, the higher the level of codification.

The responses to Hypotheses 8 and 9 are combined as follows.

There is no statistical evidence to show that the further a company progresses along the knowledge life-cycle, the higher the level of codification; nor does firm size contribute to level of codification. However, knowledge life-cycle and firm size are highly correlated with each other.

A study of the effects of size on organizational performance by Child (cited in Senior, 2002, p.104) finds out that for large organizations, the more bureaucratic they are in structure, the better they perform. Therefore, for better organizational performance, level of codification is positively proportional to firm size. Another research project carried out by Pugh (cited in Senior, 2002, p.104) finds that the size of an organization (measured by the number of employees) is positively correlated with the overall role specialization and formalization. These two studies conclude that, the higher the level of codification, the greater is the extent of formalization. In contrast to the above, the results of this study reveal no relationship whatsoever between firm size and level of codification.

The research findings also do not support Atherton's observation that the nature of knowledge in small businesses is personalization, in contrast to codification that underpins large businesses (Atherton, 2003, p.1380). There is also no statistical support for Gottschalk and Khandelwal's argument that larger firms are more advanced in codification than smaller ones, based on survey results from Australian law firms (Gottschalk and Khandelwal, 2003, p.104).

Similarly, there is no statistical evidence to support Lee and Suh's finding that small-to-medium-sized companies prefer personalization to codification because of the small number of employees, problems of high replacement rates and difficulty with securing high quality human resources (Lee and Suh, 2003, p.334). On the other hand, the finding is consistent with Buckman's contention that the size of business is not crucial – size is largely irrelevant. In fulfilling organizational strategy, the most critical need is the movement of knowledge (Buckman, 2004).

5.2.3 Research question 3

Is the choice of codification-personalization strategy different between local- and

foreign-owned companies, and among different sectors?

Hypothesis 10: There is no difference in the choice of codification-personalization strategy among various sectors.

The level of codification significantly differs across the six sectors of MSC-status companies. It can be found that the creative multimedia sector has significantly lower level of codification (30.73) compared with the sectors of software development (37.53), Internet-based business (39.43), and shared services and outsourcing (37.57). This finding is logical by examining the employee composition. In the creative multimedia sector, creativity and innovation are the key criteria of human resource, leading to a distinctively lower level of codification compared with other sectors. Personalization strategy enables out-of-the-box thinking and facilitates new or specialized ways of doing things (Hansen and Nørbjerg, 2005, p.4).

Creativity, the generation of novel and useful ideas, has been identified as an important factor in organizational learning and knowledge management. In creative multimedia, companies focus on dialogue between individuals, but not knowledge objects in a database. Knowledge that has not been codified is transferred in brainstorming sessions and one-to-one conversations. Knowledge workers collectively arrive at deeper insights by going back and forth on problems they need to solve (Gottschalk, 2005, p.33). While creativity is the generation of novel and useful ideas, innovation is the implementation of these ideas (Jackson, Hitt and DeNisi, 2003, p.344). Research undertaken on 70 companies in Australia and New Zealand from both the private and the public sectors reveals that there is a significant and positive relationship between personalization and innovation (Gloet and Terziovski, 2004, p.408).

As far as the software industry is concerned, there is no defined strategy. On one hand, codification is the primary task for infomediary (Whitten and Stephens, 2002, p.53), for enterprise portal (Cloete and Snyman, 2003, p.240) and for e-learning (Kathawala and Wilgen, 2004, p.505). On the other hand, personalization strategy is predominant in the Internet travel marketplace (Smith, 2004b, p.298). However, there is no affirmative strategy for software process improvement (Mathiassen and Pourkomeylian, 2003, p.78).

McMahon, Lowe and Culley argue that both personalization and codification are necessary for design organization. Their argument is supported by the analysis finding

of this study. In Appendix D33, the mean level of codification for the sector of hardware design is 38.07, which is classified as hybrid strategy. It is valid to mention that activities characteristic of the early stages of new concept design should not be automated, since they are not sufficiently well understood. Once the aspects of the design process are well understood then efforts should be made for codification (McMahon, Lowe and Culley, 2004, p.318).

Hypothesis 11: There is no difference in the choice of codification-personalization strategy between local- and foreign-owned companies.

While previous studies in Chapter 2 conclude that there is no firm answer on the choice of codification-personalization strategy according to country, this study shows that there is a difference in the choice of codification-personalization strategy between local- and foreign-owned companies, whereby the level of codification for local-owned companies is significantly higher than that of foreign-owned companies.

Similar research conducted by Gloet shows that managers in Hong Kong are more predisposed to codification compared with their Australian counterparts. In a high-context culture such as Malaysia, characterized by hierarchical relationships, ascribed status and a tendency toward well-structured formal lines of communication within organizations, managers are more inclined to codification where the flow of knowledge is more explicit and therefore more readily controlled (Gloet, 2002, p.314).

A few reasons account for higher level of codification of Malaysian companies compared with foreign ones. The first is due to high employee turnover in Malaysia. When employees leave a company, they often bring along with them valuable and critical knowledge necessary for the continued operations of the company. In most cases, the complex knowledge in the heads of the departing employees cannot be retained by the company. Therefore, as much as possible, Malaysian companies prefer to capture critical knowledge in less volatile forms such as knowledge codification. Some companies capture important knowledge from employees through the establishment of groupware systems (Abdulai, 2004, p.209).

Secondly, after the Asian financial crisis that hit Malaysia in 1997, the business environment in Malaysia has been uncertain with downsizing, mergers and acquisitions, and business failures. Job security is becoming a thing of the past. For example, Bank

Negara Malaysia, the central bank of Malaysia, announced on 29 July 1999 the merger program for domestic banking institutions, in the creation of six domestic banking groups from 61 banking institutions (Malaysian Internet Resources, 1999). Departments and divisions with similar work functions have been merged. Many bank employees had to leave under the voluntary separation scheme, despite their years of service, commitment and contribution to the knowledge-base of the company. With such an uncertainty in the business environment, employees tend to protect their tacit knowledge. By guarding such knowledge and as long as it is still needed by the employer, their service will continue to be relevant (Abdulai, 2004, p.210). Realizing this tendency, Malaysian companies are geared towards codification strategy in knowledge management.

Thirdly, Malaysian companies resort to higher level of codification because Asians, including Malaysians, are comparatively less creative than their western counterparts, according to Ng in his book "Why Asians are Less Creative than Westerners" (cited in Abdulai, 2004, p.178). Ng asserts that the *raison d'être* why Asians are less creative is because they are the products of a collective society where they have been nurtured to fit into their social group. They have been trained to be psychologically dependent on the social group; social conformance meets their psychological need for validation. This psychological make-up produces the uncreative behavior. While the western society places emphasis on open and democratic exchange of ideas, the Asian society emphasizes harmony and avoidance of conflict. The typical Asian society is hierarchical whereas the western society is of an egalitarian nature. This difference contributes to the theory that Asians are less creative than the westerners, as creativity is strongly influenced by culture.

5.2.4 Research question 4

Does a hybrid strategy, if any, lead to better organizational performance?

Hypothesis 12: Companies that adopt a hybrid strategy perform better.

The quantitative results reveal that companies adopting a hybrid strategy have higher organizational performance than companies adopting either a codification or a personalization strategy, however the difference is not statistically significant. There is no significant difference in the overall organizational performance between companies

adopting a hybrid strategy and companies adopting either a codification or a personalization strategy.

Despite HNT's warning against a dual emphasis on both strategies simultaneously whereby straddling the two strategies risks failing at both (Hansen, Nohria and Tierney, 1999, p.112), the findings of this study show otherwise. The findings further verify the existence of hybrid strategy from the existing literature (Scheepers, Venkitachalam and Gibbs, 2004, p.217; Smith, 2004c, p.15; Torgeir and Reidar, 2002, p.410; Edwards, et al., 2003, p.52; Lowendahl, Revang and Fosstenlokken, 2001, p.920; McMahon, Lowe and Culley, 2004, p.318; Sheehan, 2000, p.13; Gloet and Berrell, 2003, p.86).

5.2.5 Operationalization of knowledge management strategy

From the measurement assessment using reliability analysis and factor analysis, Cronbach's alphas obtained from this research are compared with the borrowed sources in Table 5.2.5.

Table 5.2.5: Comparison of Cronbach's alphas

Construct (operationalization)	Cronbach's alpha in this study	Cronbach's alpha of the borrowed source	Source
Organizational culture (culture strength)	0.846	Not available	Daft, 2003, p.98.
Leadership (degree of transactional leadership)	0.822	0.79	Hartog, Van Meijen and Koopman, 1997, p.30.
Organizational structure (organicity)	0.847	0.827	Naman and Slevin, 1993, p.152.
Organizational performance	0.826	0.83	Jaworski and Kohli, 1993, p.68.
Codification-personalization strategy	0.734	Not available	Tiwana, 2002, p.151.

Cronbach's alphas are 0.846 for ten items of organizational culture (OC1 to OC10),

0.847 for seven items of organizational structure (OS1 to OS7), 0.822 for six items of leadership (L4 to L9) and 0.826 for two items of organizational performance (P1 and P2).

A very high alpha, that is greater than 0.90, probably means that the scale items are repetitious or that there are more items in the scale than are really necessary for a reliable measure of the concept (Leech, Barrett and Morgan, 2005, p.67). This does not happen here as all Cronbach's alphas are smaller than 0.90. The convergence of alpha values obtained in this study and those of the borrowed sources verifies the reliability and validity of the psychometric properties of the borrowed scales after being transferred from the western context to the Malaysian setting (Sekaran, 1983, p.63).

As for the construct operationalization of codification-personalization strategy, the highest Cronbach's alpha is 0.568 when local- and foreign-owned companies are taken together. In investigating whether the low reliability is due to the lack of internal consistency, or due to some other reason, reliability analysis has been repeated separately for local- and foreign-owned companies. Cronbach's alpha for local-owned companies is 0.513 whereas for foreign-owned companies, it is 0.734. The fact that Cronbach's alpha exceeds 0.7 for foreign-owned companies demonstrates that Tiwana's multi-item scale can be a reliable one.

Cronbach's alpha for level of codification (0.734) is lower compared with those for other constructs: organizational culture (0.846), organizational structure (0.847), leadership (0.822) and organizational performance (0.826). This shows the difficulty in operationalizing codification-personalization strategy. In fact, KM strategy in terms of codification and personalization is such a big construct that it needs a nine-item scale for operationalization. Similar problem has been highlighted by the following two authors.

As Scarbrough has noted, knowledge-based concepts defy measurement. As a consequence, it is difficult to appreciate to what extent organizational performance is really affected by its knowledge-base (Scarborough, 1998, p.219).

Patriotta argues that the assumptions underlying knowledge-based theories of the firm highlight major methodological difficulties. Competencies, resources and capabilities may well provide a sound terminology for a theory of knowledge, but at the same time

they seem to be problematic as far as empirical validation is concerned. In fact, the difficulty implicit in the search for a conceptual definition of knowledge-based factors seems to conceal a deeper methodological problem (Patriotta, 2003).

The low Cronbach's alpha for local-owned companies at 0.513 suggests that either Malaysian companies generally do not have a KM strategy, or Malaysian companies still do not know how to deploy a KM strategy.

The reason for the absence of a KM strategy is probably due to the fact that organizational change is occurring so fast that the rate of codification is unable to catch up with the pace of organizational change. The creation of a KM strategy takes time and forces companies to balance short- and long-term strategic resource decisions. Companies must therefore determine whether their efforts are best focused on long-term knowledge exploration, short-term knowledge exploitation, or both (Zack, 1999, p.137).

As an example, Shell started with a codification strategy by spending millions building databases of detailed technical documents. However, nobody searched them and they were quickly out-of-date. Consequently, Shell abandoned this approach and now focuses on e-learning packages that deliver a mix of standards and a connection to a global network (Benbya and Belbaly, 2005, p.212).

In a knowledge economy, formulating a KM strategy may take some time. During the implementation stage some scenarios may change, making the KM strategy out-of-date or behind time. Although a just-in-time strategy may be implemented with allowances for modification and adaptation, this strategy is basically not in the agenda of Malaysian companies (Kim, 2004, p.69).

On the other hand, some local-owned companies do intend to implement a KM strategy. Nonetheless, KM strategy is not well understood. There are two key factors contributing to this. First, knowledge management is a relatively new area of interest in Malaysia. While marketing strategy is distinctively divided into cost leadership, differentiation and focus strategy (Kotler et al., 1999, p.92), similar generic classification of strategy is not well established in knowledge management, as far as Malaysia is concerned. Secondly, codification-personalization strategy has not been well researched in the eastern context in general, and in Malaysia specifically.

Having discussed the findings of this research, claims for contributions to research are now made.

5.3 CONTRIBUTIONS TO RESEARCH

This dissertation endeavors to contribute to several fields of study by addressing the following objectives:

1. to examine the influence of various determinants on KM strategy;
2. to study how the choice of KM strategy influences organizational performance;
3. to contribute to the understanding of knowledge management, especially its strategic aspects;
4. to raise awareness of the inter-relationships between organizational culture, organizational structure, leadership and codification-personalization strategy, and;
5. to develop insight into the premise that KM strategy is likely to be linked to business strategy.

Based on these objectives, this research is significant in making theoretical, managerial, policy and methodological contributions, subject to the limitations and delimitations of the research in the subsequent section. Although the concepts discussed are not necessarily new, the context in which they are investigated and the combined topics of organizational culture, organizational structure, leadership and KM strategy serve to provide new perspectives from which to approach them. The implications of these perspectives are now discussed in turn.

First, this study makes a theoretical contribution in gaining new and important insights into the postulated hybrid strategy. It not only addresses a gap in the body of knowledge, but identifies an important gap within the relevant body of knowledge (Perry, 1998).

Chapter 1 explained that HNT recommend companies pursue one strategy predominantly and use the second strategy to support the first, based on an 80-20 split. Organizations are warned against a dual emphasis on both strategies. The business environment has been changing since HNT's categorization of codification-personalization strategy. While HNT suggest that codification and personalization

strategies may be mutually exclusive, at times companies have no alternative but to straddle both strategies of codification and personalization and adopt a hybrid strategy. The existence of hybrid strategy manages to bridge the research gap between the two extremities of codification and personalization.

Apart from contributing to the academic literature, the managerial contribution of this dissertation is twofold: first, it raises awareness of various determinants that influence codification-personalization strategy and, secondly, it advances understanding of inter-linked relationships among organizational structure, organizational culture, leadership and codification-personalization strategy. It is predicted that the findings will assist managers in organizational design. The findings of this study also have important implications for businesses operating in the global market.

In terms of policy contribution, the examination of the relationship between KM strategy and organizational performance will reveal the merit of each strategy: codification, hybrid or personalization. Thus, managers can use the information to make decisions on the appropriate strategy to pursue.

Finally, in relation to methodological contribution, when importing scales from other disciplines, this research contributes to new knowledge by updating, refining, and adapting the scales to the KM discipline (Varadarajan, 1996, p.5). By transferring western-generated scales to the Malaysian context, the reliability and validity of borrowed scales are tested for their psychometric properties (Sekaran, 1983, p.63). Besides adding to the body of knowledge, the results will pave the way for further research.

Following the brief summary of this study's contribution to research, the limitations and delimitations of this research will now be discussed.

5.4 LIMITATIONS AND DELIMITATIONS

Strictly speaking, limitations are beyond the researcher's control while delimitations are within control (Perry, 1998). Chapter 1 outlines three potential delimitations of the research design pertaining to external validity (generalizability), internal validity and construct validity. Therefore, this section draws attention to any further limitations and delimitations that became apparent later in the study.

5.4.1 Delimitations

First, this study is based on a positivist approach of which the goal is to seek out propositions that can be generalized to an infinitely large number of phenomena, people and settings. In other words, the positivists endeavor to identify context-free generalizations, or nomothetic statements (Hudson and Ozanne, 1988, p.511). The research is confined to within Malaysia. The MSC-status companies are chosen as the sampling frame, thus the sample used in this study may not represent the wider population. By surveying only the MSC-status companies in Malaysia, other organizational groups are excluded. Thus, generalizability to other industries and countries should be treated with caution.

Secondly, this study is based on cross-sectional data. For internal validity, future research should analyze the dynamics of change in the antecedents and consequences of codification-personalization strategy by employing longitudinal data.

Thirdly, with regard to construct validity, the measure of organizational performance in this study may not be comprehensive. Further research should extend the measure of organizational performance using objective measures, in addition to, or in combination with, subjective approach adopted in this research. One comprehensive tool that is now widely used by US companies is Kaplan and Norton's Balanced Scorecard, which combines financial with non-financial measures, encompassing financial perspectives, customer perspectives, innovation and learning perspectives, and internal business perspectives in evaluating the organizational performance (Kaplan and Norton, 1993, p.136; Arora, 2002, p.249). Nevertheless, it is not possible to include every potential measure when undertaking a research. Therefore, comprehensive perspectives will be left to future studies.

Fourthly, from the choice of qualitative, quantitative and combined methodologies, the quantitative methodology has been chosen. This study uses only one method to define operationally the construct of codification-personalization strategy. In this respect, the study suffers from mono-method bias. The problem with mono-method bias is that any effect found may be an artifact of the method employed rather than the construct under study (Teh, 2002, p.214). To overcome this, other methods of qualitative methodology could be considered.

Finally, single informants are used as the source of information. Although single informants have been used primarily in most social science studies, multiple informants would enhance the validity of the research findings (Brockman and Morgan, 2003, p.407). Although the CEO (or equivalent) is generally viewed as the single individual in an organization who is most qualified to provide valid responses to questions pertaining to the organization (Conant, Mokwa and Varadarajan, 1990, p.371), their opinions may not capture the entire situation across all levels of the organization.

5.4.2 Limitations

Certain limitations to the study must be considered. First, the structured approach of this dissertation is limited to the academic area of knowledge management. That is, the structure may not be appropriate for other areas using relatively unusual methodologies such as historical research designs or grounded theory (Perry, 1998).

Although various measures have been undertaken to increase the response rate as described in Chapter 3, questionnaire results indicate that low response rate remains a limitation. Subsequent to that, the non-normality of the results and the number of subjects below 30 entail the use of nonparametric statistical tests.

5.5 IMPLICATIONS FOR FURTHER RESEARCH

The research findings reveal a number of areas which warrant further study. First, the reliability of the multi-item scale borrowed from Tiwana for the construct of codification-personalization strategy should be further verified in future research. Secondly, further research could be conducted using a sampling frame of a different industry, in a different country. Thirdly, there is a need for qualitative methodology to complement the research findings.

From the literature review, the determinants of codification-personalization strategy that have been identified are: knowledge life-cycle, organizational structure, firm size, employee characteristics, leadership, organizational culture, reward system, ICT, and environment. From these, organizational structure, organizational culture, leadership, knowledge life-cycle and firm size have been researched in this study. Future studies can be directed at the remaining determinants: employee characteristics, reward system, ICT, and environment.

The statistical results demonstrate that organizational culture, organizational structure, leadership, life-cycle and firm size are insignificant in predicting KM strategy. Apart from the remaining determinants of employee characteristics, reward system, ICT, and environment, what other determinants could possibly be significant in contributing to KM strategy? According to Zack, research with more than 25 firms has found that the most important context for guiding knowledge management is the firm's strategy (Zack, 1999, p.125).

Knowledge drives strategy. Strategy drives knowledge management (Tiwana, 2002, p.148). Due to the insignificance of regression analyses indicating the absence of KM strategy among Malaysian companies, further research is suggested to investigate the alignment of KM strategy with business strategy, whereby the importance has been acknowledged by several authors (Zack, 1999, p.136; Tiwana, 2002, p.148; Yahya and Goh, 2002, p.464; Awad and Ghaziri, 2004, p.74).

SWOT (strength, weakness, opportunity and threat) analysis is probably the most widely used framework for defining strategy, having influenced both practice and research since 1971. The application of SWOT analysis has been dominated by Porter's 'five-forces' model dating back to 1980. Nevertheless, Porter's model addresses the profitability of industries rather than individual firms and therefore does not assist companies to identify their competitive advantages. Researchers then focused on firms' resources and competencies – referred to as the resource-based view (RBV) (Zack, 1999, p.127).

RBV was promoted by Prahalad and Hamel in 1990, Barney in 1991 and Teece, Pisano and Shuen in 1997 (Benbya and Belbaly, 2005, p.203). According to RBV, performance differences across firms can be attributed to variances in the firms' resources, which are considered strategic if they are (i) valuable, (ii) unique, (iii) non-imitable, (iv) non-transferable, (v) non-substitutable, (vi) exploitable, and (vii) combinable (Gottschalk, 2006, p.113). The central notion of RBV is that companies in the same industry compete with generally the same resources, but combine them in different ways, making idiosyncratic combinations of resources (April, 2002, p.446).

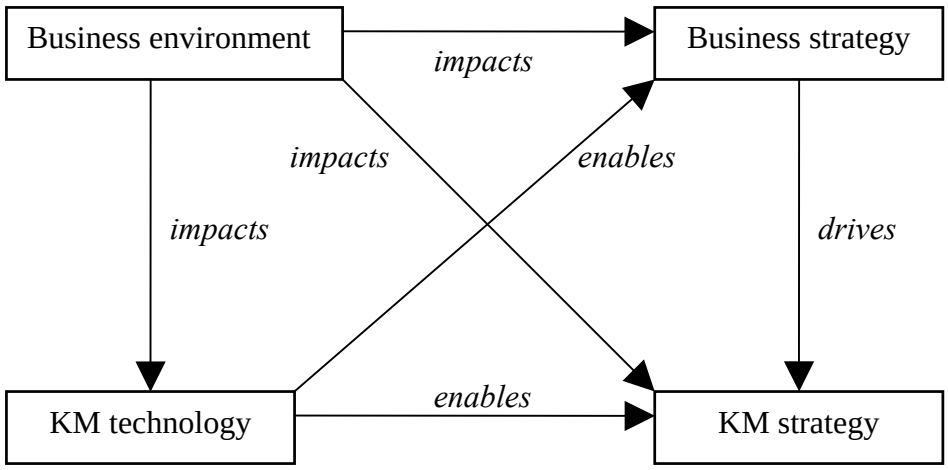
Traditional resources are of three broad types: human resources, natural resources and manufactured resources (Sloman and Sutcliffe, 1999, p.2). Knowledge, which Guthrie

(2001, p.27) called intellectual capital (IC), has become the fourth type of resource. Unlike traditional resources, knowledge is not easily purchased in the marketplace in a ready-to-use form (Zack, 1999, p.128).

In RBV, there has to be consistency between resources and business. The logic behind this requirement is that the resources should create a competitive advantage in the business in which the firm competes. To meet this requirement, corporate resources can be evaluated against key success factors in each business. When doing so, it is important to keep in mind that in order to justify retaining a business, or entering a business, the resources should convey a substantial advantage (Gottschalk, 2005, p.53).

Figure 5.5 illustrates the need to match KM strategy with business strategy. Business environment, such as government regulations and competitive threats, impacts upon business strategy on a regular basis. Business strategy, in turn, drives KM strategy. This necessitates the alignment of both strategies (Awad and Ghaziri, 2004, p.74).

Figure 5.5: Aligning knowledge management strategy with business strategy
(adapted from Zack, 1999; Awad and Ghaziri, 2004)



According to Earl, the strategic school views knowledge management as the essence of a firm's strategy (Gottschalk, 2005, p.32). Strategy choice depends not only on clients and the economics of business but also on the employees involved, as well as a firm's overall competitive strategy (Hazlett, McAdam and Gallagher, 2005, p.37). To explicate the link between knowledge and strategy, an organization must articulate its strategic intent, identify the knowledge required to execute its intended strategy, and compare that to its actual knowledge, thus revealing its strategic knowledge gaps (Gottschalk,

2005, p.73).

Having mapped the firm's competitive knowledge position, a company can perform a gap analysis. The gap between what a firm must do to compete and what it actually is doing represents a strategic gap. Strategy, then, represents how the firm balances its competitive *cans* and *musts* to develop and protect its strategic niche (Zack, 1999, p.135; Gottschalk, 2005, p.74). To give knowledge management a strategic focus, the firm's knowledge management initiatives should be directed toward closing this strategic knowledge gap. Having an appropriate KM strategy in place is essential for assuring that KM efforts are being driven by and are supporting the firm's competitive strategy (Gottschalk, 2005, p.76).

5.6 CONCLUSION

The landmark article by HNT recommends companies to pursue one strategy predominantly and use the second strategy to support the first, based on an 80-20 split: 80 percent follows one strategy and 20 percent the other. Organizations are warned against a dual emphasis on both strategies simultaneously. This research shows that in the modern business environment, companies can straddle both strategies of codification and personalization and adopt a hybrid strategy, without affecting organizational performance. The codification-personalization classification purported by NHT is little known in the corporate world, especially in Malaysia, and this dissertation sets a foundation for further research.

For companies in the vanguard of the global market, the balance between knowledge and traditional resources has shifted so far towards the former that knowledge has become perhaps the most important factor in determining organizational performance. Today's most successful companies are truly knowledge-based. In the era of globalization, the information age heralds the 'death of distance'. This will be one of the most dynamic shaping forces for Malaysian companies. In this new view, in order to compete with the rest in the world, Malaysian companies need to deploy a KM strategy. Malaysia is no longer on the edge, but at the edge (Ernst and Young, 1999).

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APPENDIX A: QUESTIONNAIRE

18 April 2006

For further information:
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Knowledge Management Strategy
SURVEY INFORMATION SHEET

Dear Sir,

My name is KC Tan, a Malaysian candidate in a Doctor of Business Administration program with the University of Newcastle, Australia. As part of my research, I am conducting a survey on knowledge management strategy among companies that have been granted the Multimedia Super Corridor (MSC) status of which your company is one This information was obtained from MSC's official website (www.msc.com.my/cs/company). By virtue of your company's expertise and high regard I would like to include your responses so as to identify issues pertaining to knowledge management, and ultimately recommend improvements to company performance.

The survey by way of a questionnaire (with a reply-paid envelope) is enclosed, which should take approximately **20 minutes** to complete. If you are unable to attend to this yourself, please pass the questionnaire on to a colleague who is familiar with your company's strategic situations to respond. All information gathered will be treated in the strictest confidence.

Kindly return the completed questionnaire by **11 May 2006**. Participation is entirely voluntary; however, I would greatly appreciate your contribution. All questionnaires collected from the survey will be stored securely and once the data has been analyzed and the study completed, they will be destroyed.

If you have any concerns, please contact my supervisor, Dr. L. G. Whitehouse, at the above address.

Thank you for your assistance and I look forward to receiving your completed questionnaire. Please note you are not required to sign the questionnaire, all responses are anonymous.

Yours sincerely,

Ir. KC Tan
DBA Candidate, MBA, BEng, PEng, MIEM
Mobile phone: 019-2376032
Email: tkc1668@streamyx.com

Complaint Clause:

This project has been approved by the University's Human Research Ethics Committee, Approval No.: ***Bus-Law/:SEGi/5-6/17:06A****. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is referred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, telephone 02-49216333, email* HumanEthics@newcastle.edu.au*.*

Section A Please circle ONE number from 1 to 5 according to the scale below that best describes your organization:

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

A Organizational Culture

1.	Virtually all managers and most employees can describe the company's values, purpose, and customer importance.	1	2	3	4	5
2.	There is clarity among company members about how their jobs contribute to company goals.	1	2	3	4	5
3.	It is very seldom that a manager will act in a way contrary to the company's values.	1	2	3	4	5
4.	Warmth and support of co-workers is a valued norm, even across departments.	1	2	3	4	5
5.	The company and its managers value what is best for the company over the long term more than short-term results.	1	2	3	4	5
6.	Leaders make it a point to develop and mentor others.	1	2	3	4	5
7.	Recruiting is taken very seriously, with multiple interviews in an effort to find characteristics that fit the company's culture.	1	2	3	4	5
8.	Recruits are given negative as well as positive information about the company to enable them to freely choose whether to join.	1	2	3	4	5
9.	Employees are expected to acquire real knowledge and mastery – not political alliances – before they can be promoted.	1	2	3	4	5
10.	Company values emphasize what the company must do well to succeed in a challenging environment.	1	2	3	4	5
11.	Conformity to company mission and values is more important than conformity to procedures and dress.	1	2	3	4	5
12.	You have heard stories about the company's leaders or "heroes" who helped make the company great.	1	2	3	4	5
13.	Ceremonies and special events are used to recognize and reward individuals who contribute to the company in significant ways.	1	2	3	4	5

B Leadership

In my organization,…

1.	Leaders focus attention on irregularities, mistakes, exceptions and deviations from what is expected.	1	2	3	4	5
2.	Leaders keep careful track of mistakes.	1	2	3	4	5
3.	Leaders monitor performance for errors needing correction.	1	2	3	4	5
4.	Leaders point out what subordinates will receive if doing what is required.	1	2	3	4	5
5.	Leaders tell subordinates what to do to be rewarded for efforts.	1	2	3	4	5

6.	Leaders are alert for failure to meet standards.	1 2 3 4 5
7.	Leaders work out agreements with subordinates on what will be received if doing what needs to be done.	1 2 3 4 5
8.	Leaders talk about special rewards for good work.	1 2 3 4 5
9.	Leaders demonstrate a strong conviction in their beliefs and values.	1 2 3 4 5

C	**Performance**	Poor				Excellent
1.	Overall performance of the company last year.	1	2	3	4	5
2.	Overall performance relative to major competitors last year.	1	2	3	4	5

Section B For each pair of opposite descriptions, please circle ONE number from 1 to 7 according to the scale below that best approximates the emphasis between A and B in your organization:

A	Strongly emphasize A	Moderately emphasize A	Slightly emphasize A	Emphasize A and B equally	Slightly emphasize B	Moderately emphasize B	Strongly emphasize B	**B**
	1	2	3	4	5	6	7	

In general, the management philosophy of my organization favors…		
Highly structured channels of communication.	1 2 3 4 5 6 7	Open channels of communication.
A strong insistence on a uniform managerial style throughout the organization.	1 2 3 4 5 6 7	Managers' operating styles allowed to range freely from the very formal to the very informal.
A strong emphasis on giving the most say in decision-making to formal line managers.	1 2 3 4 5 6 7	A strong tendency to let the expert in a given situation have the most say in decision-making even if this means temporary bypassing of formal line authority.
A strong emphasis on holding fast to tried and true management principles despite any changes in business conditions.	1 2 3 4 5 6 7	A strong emphasis on adapting freely to changing circumstances without too much concern for past practice.
A strong emphasis on always getting personnel to follow formal procedures.	1 2 3 4 5 6 7	A strong emphasis on getting things done even if it means disregarding formal procedures.

Tight formal control of most operations by means of sophisticated control and information systems.	1 2 3 4 5 6 7	Loose, informal control; heavy dependence on informal relationships and norms of cooperation for getting work done.
A strong emphasis on getting line and staff personnel to adhere closely to formal job descriptions.	1 2 3 4 5 6 7	A strong tendency to let the requirements of the situation and the individual's personality define proper on-job behavior.

1. What type of business do you think your company is in?		
Providing creative, rigorous and highly customized services and products.	1 2 3 4 5 6 7	Providing high-quality, reliable, fast, and cost-effective services and products.
2. What is the costing model used for your company's products and services?		
Expert-based pricing; high prices are not detrimental to your business; price-based competition barely (if at all) exists.	1 2 3 4 5 6 7	Price-based competition.
3. What are your company's typical profit margins?		
Very high profit margins.	1 2 3 4 5 6 7	Very low profit margins; overall revenues need to be maximized to increase net profits.
4. How best can you describe the role that information technology (IT) plays in your company's work processes?		
Storage and retrieval are not the primary applications of IT. IT is considered a great enabler for communications. Applications such as e-mail and video conferencing are considered the most useful applications. Conversations and exchange of tacit knowledge are considered to be the primary use of IT.	1 2 3 4 5 6 7	IT is a primary enabler; the objective is to connect people distributed across the enterprise with codified knowledge (such as reports, documentation, code, etc.) that is in some reusable form.

5. How much old material, such as past project data, existing documents, and archived projects, are reused as a part of new projects?		
Every project has a high chance of being a "one-off" and unique project. Although cumulative learning is involved, highly creative solutions are often called for.	1 2 3 4 5 6 7	Reuse portions of old documents to create new ones. Use existing products to create new ones. Need not begin from scratch to deliver a new product or service.
6. What is your reward structure like?		
Employees are rewarded for directly sharing their knowledge with colleagues and for assisting colleagues in other locations or offices with their problems.	1 2 3 4 5 6 7	Employees are rewarded for using and contributing to databases such as Notes discussion databases.
7. How is knowledge exchanged and transferred?		
Knowledge is transferred person to person; intra-firm networking is encouraged to enable sharing of tacit knowledge, insight, experience, and intuition.	1 2 3 4 5 6 7	Employees refer to a document or best practices database that stores, distributes, and collects codified knowledge.
8. Where do your company's economies of scale lie?		
Economies of scale rest in the sum total of expertise available within the company; experts in various areas of specialization are considered indispensable.	1 2 3 4 5 6 7	Economies of scale lie in the effective reuse of existing knowledge and experience and applying them to solve new problems and complete new projects.
9. What are your typical team structure demographics?		
Junior employees are not an inordinate proportion of a typical team's total membership.	1 2 3 4 5 6 7	Large teams; most members are junior-level employees; a few project managers lead them.

Section C Please tick (√) in only ONE box for each question.

1. Nature of core business

☐	Creative multimedia	☐	Hardware design
☐	Software development	☐	Internet-based business
☐	Support services	☐	Shared services & outsourcing

2. Major equity ownership

☐	Local	☐	Foreign

3. Current operational status

☐	Seed	☐	Pre Initial Public Offering (IPO)
☐	Start-up	☐	Post IPO
☐	Growth	☐	Multi-national or subsidiaries thereof

4. Annual revenue (turnover)

☐	Less than RM 1 million	☐	RM 10 million – RM 20 million
☐	RM 1 million – RM 5 million	☐	RM 20 million – RM 50 million
☐	RM 5 million – RM 10 million	☐	More than RM 50 million

5. Number of employees

☐	Less than 10	☐	50 – 100
☐	10 – 20	☐	100 – 200
☐	20 – 50	☐	More than 200

APPENDIX B: VARIABLE DESCRIPTION

Variable Description

Variable	Description	Measurement
OC1	Organizational culture item 1	Scale
OC2	Organizational culture item 2	Scale
OC3	Organizational culture item 3	Scale
OC4	Organizational culture item 4	Scale
OC5	Organizational culture item 5	Scale
OC6	Organizational culture item 6	Scale
OC7	Organizational culture item 7	Scale
OC8	Organizational culture item 8	Scale
OC9	Organizational culture item 9	Scale
OC10	Organizational culture item 10	Scale
OC11	Organizational culture item 11	Scale
OC12	Organizational culture item 12	Scale
OC13	Organizational culture item 13	Scale
L1	Leadership item 1	Scale
L2	Leadership item 2	Scale
L3	Leadership item 3	Scale
L4	Leadership item 4	Scale
L5	Leadership item 5	Scale
L6	Leadership item 6	Scale
L7	Leadership item 7	Scale
L8	Leadership item 8	Scale
L9	Leadership item 9	Scale
P1	Performance item 1	Scale
P2	Performance item 2	Scale
OS1	Organizational structure item 1	Scale
OS2	Organizational structure item 2	Scale
OS3	Organizational structure item 3	Scale
OS4	Organizational structure item 4	Scale
OS5	Organizational structure item 5	Scale
OS6	Organizational structure item 6	Scale
OS7	Organizational structure item 7	Scale
LC1	Level of codification item 1	Scale
LC2	Level of codification item 2	Scale
LC3	Level of codification item 3	Scale
LC4	Level of codification item 4	Scale
LC5	Level of codification item 5	Scale
LC6	Level of codification item 6	Scale
LC7	Level of codification item 7	Scale
LC8	Level of codification item 8	Scale
LC9	Level of codification item 9	Scale
S	Sector	Nominal
MEO	Major equity ownership	Nominal
COS	Current operational status	Ordinal
AR	Annual revenue	Ordinal
NOE	Number of employees	Ordinal
OS	Organizational structure	Scale
OC	Organizational culture	Scale
L	Leadership	Scale
LC	Level of codification	Scale
P	Performance	Scale
FS	Firm size	Ordinal
LCL	LC (local)	Scale
LCF	LC (foreign)	Scale
PPC	Performance for personalization-codification strategies	Scale
PHY	Performance for hybrid strategy	Scale
KMS	Knowledge management strategy	Nominal

APPENDIX C: SPSS DATA LISTING

	OC1	OC2	OC3	OC4	OC5	OC6	OC7	OC8	OC9	OC10	OC11	OC12	OC13	L1
1	5	5	5	5	5	5	5	5	5	5	4	4	4	3
2	3	4	2	3	4	4	4	4	4	4	5	5	5	2
3	3	4	5	5	4	4	5	5	5	4	4	4	4	3
4	2	3	4	4	5	4	2	4	5	4	5	4	2	2
5	4	4	4	4	3	3	5	4	5	5	5	3	3	2
6	3	3	3	4	4	4	2	3	4	4	3	3	3	3
7	4	4	5	4	5	4	3	3	4	5	5	3	2	3
8	4	4	3	4	4	4	3	3	3	4	4	4	3	3
9	5	5	5	5	5	5	3	5	5	5	5	5	3	2
10	3	3	4	4	4	4	3	4	4	4	4	3	4	4
11	4	4	5	4	5	4	4	4	4	5	3	3	4	4
12	4	5	3	5	5	4	3	5	5	4	4	4	1	4
13	4	4	4	4	4	5	4	4	5	5	4	4	4	3
14	4	4	4	4	4	5	3	5	4	4	5	3	5	1
15	3	3	4	4	4	4	5	4	4	4	4	4	3	4
16	4	4	4	4	4	4	4	4	4	3	5	4	3	4
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54	4	4	3	3	4	3	3	4	3	4	7	7	7	7
55	2	3	4	4	5	4	4	5	3	2	7	5	5	5

	L2	L3	L4	L5	L6	L7	L8	L9	P1	P2	OS1	OS2	OS3	OS4
56	4	4	2	2	4	4	2	4	3	3	6	3	3	3
57	4	4	4	4	4	4	4	4	3	3	6	6	3	5
58	4	4	5	5	5	4	4	5	5	5	6	6	5	5
59	4	4	4	4	3	4	3	4	4	4	5	6	5	4
60	5	5	5	5	5	5	5	5	5	5	4	2	2	4
61	4	4	4	4	4	2	4	4	5	5	6	6	2	6
62	2	1	5	4	5	4	4	4	5	4	7	6	4	6
63	3	3	2	3	3	2	3	3	4	4	1	4	4	4
64	4	5	5	5	5	4	4	4	3	1	1	4	4	1
65	3	3	5	4	3	2	3	4	4	4	5	4	3	4
66	4	4	3	3	3	3	3	3	3	3	5	5	4	6
67	5	5	4	4	5	4	3	4	5	5	6	5	6	4
68	4	3	5	5	5	3	5	5	3	3	7	.	.	.
69	4	4	4	4	4	4	4	4	4	3	4	4	2	6
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71	4	5	3	1	5	4	1	3	4	4	4	6	4	1
72	5	4	4	4	4	4	3	4	4	3	1	4	1	1
73	4	4	2	2	4	2	2	5	4	4	2	2	1	1
74	3	3	3	3	3	3	3	3	3	3	4	4	4	4
75	3	2	2	3	4	4	5	4	5	5	7	1	6	6
76	5	5	3	3	5	3	3	5	5	5	6	5	5	5
77	4	4	4	3	4	3	2	3	2	3	2	3	3	2
78	4	4	3	3	3	3	4	3	4	3	5	5	3	6
79	4	4	4	3	3	4	3	5	5	5	6	6	3	6
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81	5	3	3	2	4	2	2	3	3	3	2	2	6	1
82	3	4	4	3	3	2	1	4	3	3	6	5	4	5
83	4	3	4	4	4	3	4	4	4	3	1	2	6	2
84	4	3	4	3	2	2	2	3	3	3	3	3	4	3
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87	5	5	4	5	4	4	2	5	5	5	4	4	2	6
88	5	5	4	2	4	4	4	5	.	.	4	6	6	2
89	4	4	3	3	3	3	3	3	3	3	3	4	3	4
90	4	2	2	1	3	2	3	3	4	3	4	7	6	5
91	5	5	5	5	5	5	5	5	4	.	4	4	5	3
92	5	5	3	3	3	4	4	4	5	4	5	1	4	3
93	4	4	4	4	4	4	2	4	3	3	5	6	4	5
94	2	2	3	2	4	3	1	3	3	3	5	3	2	4
95	3	4	4	4	4	4	4	4	4	3	7	6	5	4
96	4	4	4	4	5	5	3	4	4	4	6	2	2	3
97	2	3	4	2	3	3	3	3	3	3	4	4	4	5
98	4	4	4	4	4	3	4	3	4	4	2	3	3	3
99	1	1	4	4	5	5	5	5	4	5	2	1	2	3
100	4	4	4	4	4	3	4	3	4	4	2	3	3	3
101	5	5	5	5	5	5	5	5	4	3	7	7	4	2
102	3	4	3	3	3	3	3	3	3	3	5	5	5	5
103	4	4	2	3	2	3	2	4	3	4	1	3	2	3
104	5	5	5	4	5	5	4	5	4	4	7	7	7	1
105	3	3	5	4	3	3	4	4	4	4	5	2	6	5
106	4	4	4	4	4	3	4	4	4	5	6	6	6	6
107	4	4	2	2	3	1	2	2	5	5	6	6	3	7
108	4	4	3	3	4	3	3	5	4	4	6	6	6	6
109	4	3	3	4	5	3	3	4	.	.	5	4	6	5
110	3	4	4	3	3	3	3	3	4	4	4	4	5	4

	L2	L3	L4	L5	L6	L7	L8	L9	P1	P2	OS1	OS2	OS3	OS4
111	5	5	5	4	5	5	1	3	4	4	6	6	6	6
112	3	4	4	4	4	2	2	4	3	3	6	6	7	5
113	4	5	3	3	4	5	3	1	1	2	6	2	3	4
114	2	4	1	3	4	2	5	3	5	4	7	6	5	5
115	3	3	1	2	2	3	1	2	3	3	4	4	6	2
116	4	4	3	4	4	4	4	4	3	3	1	2	.	6
117	5	5	2	2	4	2	2	4	4	4	6	4	5	5
118	5	5	4	3	5	4	3	5	4	4	7	7	4	4
119	4	5	4	4	4	4	4	4	4	4	3	3	4	5
120	3	3	2	4	2	3	3	3	4	4	2	5	4	5
121	5	5	4	3	5	3	3	4	5	4	6	5	4	5
122	4	4	3	4	3	3	4	3	2	2	4	6	6	2
123	4	4	4	4	4	4	2	2	4	4	6	5	5	5
124	3	4	4	5	3	3	4	4	4	4	6	5	6	5
125	3	4	4	4	4	4	4	4	4	4	5	5	6	5
126	3	4	4	3	5	3	1	4	3	5	6	6	7	6
127	5	5	4	4	5	3	4	5	4	3	4	4	4	5
128	4	4	2	2	4	2	2	3	3	4	5	5	3	3
129	4	4	4	3	3	4	2	2	4	3	7	6	1	4
130	5	5	4	4	5	2	4	5	5	5	4	2	5	3
131	4	4	4	4	4	4	4	3	4	3	6	5	5	6
132	5	2	1	1	5	1	1	1	3	1	7	7	7	3
133	4	4	4	4	4	4	3	4	4	4	6	2	3	3
134	4	4	4	4	4	3	3	3	3	4	5	4	5	4
135	4	3	3	3	3	2	2	2	3	3	5	4	4	4
136	2	4	4	3	5	4	4	5	2	2	1	3	1	1
137	4	5	5	4	5	4	3	5	5	4	5	6	7	2
138	4	4	3	3	4	3	3	4	2	3	4	2	3	2
139	5	5	3	3	5	3	3	2	3	3	3	4	5	6
140	2	2	5	5	5	5	5	5	4	5	2	7	7	7
141	4	4	4	5	4	5	5	5	3	3	4	6	6	5
142	5	5	5	3	4	4	3	4	4	4	6	5	4	5
143	4	4	4	2	4	2	3	4	4	4	5	6	4	5
144	5	5	3	3	4	3	3	3	4	4	4	6	5	4
145	4	4	4	4	4	3	4	4	3	3	6	6	2	1
146	4	4	4	5	4	4	4	4	5	5	6	6	6	6
147	4	4	2	3	4	4	3	4	3	3	4	4	4	4
148	4	4	3	3	5	4	3	4	4	3	2	4	3	5
149	5	4	1	1	3	3	1	3	5	5	1	5	7	4
150	1	1	2	1	3	1	1	1	5	5	1	2	1	4
151	3	4	4	2	4	4	4	5	4	3	6	5	4	6
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153	3	3	4	4	4	4	4	4	4	4	4	3	4	5
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156	5	5	5	5	5	5	5	5	5	5	7	1	1	7
157	4	5	4	5	5	4	4	5	4	4	6	6	7	4
158	4	4	4	4	4	5	5	5	4	4	7	6	6	6
159	3	4	3	2	4	2	2	5	2	3	6	6	6	5
160	2	2	1	1	2	1	3	2	1	2	2	3	4	3
161	4	4	4	4	4	4	4	4	.	.	2	2	2	2
162	4	4	2	2	4	2	2	4	4	4	6	5	6	5
163	2	3	4	4	4	3	4	3	4	5	4	3	5	3
164	5	5	5	5	5	5	5	5	4	5	1	1	1	3
165	4	4	4	4	4	4	2	2	3	3	2	1	1	1

	L2	L3	L4	L5	L6	L7	L8	L9	P1	P2	OS1	OS2	OS3	OS4
166	5	5	4	4	5	4	5	5	5	5	6	6	7	6
167	4	4	4	4	5	4	5	4	.	.	6	6	5	6
168	2	3	4	4	3	3	3	4	3	3	6	6	6	4
169	4	3	4	4	4	3	2	3	3	3	5	4	5	4
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171	3	5	3	3	3	4	3	4	4	4	6	5	5	5
172	2	2	2	2	4	3	2	4	4	4	2	7	3	7
173	3	3	4	4	3	3	3	4	5	5	2	3	1	2
174	2	3	4	4	4	2	4	4	2	2	3	2	2	2
175	2	4	2	2	5	3	4	4	4	4	4	2	4	6
176	4	5	4	4	5	4	3	3	3	3	2	5	3	4
177	2	2	3	2	3	2	3	2	2	3	4	3	3	5
178	3	4	3	4	5	4	3	4	4	5	6	7	5	5
179	4	4	3	4	5	4	4	4	4	4	6	.	5	4
180	2	2	2	3	3	3	2	2	3	1	2	7	7	6
181	4	4	4	5	3	4	2	3	3	3	2	1	1	2
182	3	3	3	3	3	3	3	3	4	3	4	4	4	4
183	3	3	4	4	3	3	2	3	3	4	2	3	2	2
184	4	4	3	4	4	2	4	3	3	3	6	6	4	3
185	4	4	3	3	4	4	3	3	4	4	6	6	5	5
186	4	4	4	3	4	3	4	5	4	4	4	2	4	6
187	3	3	2	2	3	2	4	3	3	4	5	6	6	7
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189	3	4	3	4	3	3	4	3	1	1	3	6	6	6
190	4	4	4	2	4	4	2	4	4	4	4	3	4	4
191	2	3	4	4	3	3	4	4	4	3	2	4	4	2
192	3	4	4	3	4	2	3	4	3	3	3	4	3	4
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194	4	4	4	2	4	4	2	4	3	3	4	4	3	4
195	3	3	3	4	4	4	4	4	.	.	5	6	6	4
196	3	4	4	3	3	3	2	4	3	4	5	6	6	4
197	4	3	2	1	2	2	1	4	3	2	4	3	5	3
198	3	4	3	3	2	2	4	3	2	3	6	6	2	7
199	4	5	3	4	4	4	3	3	5	5	7	2	3	5
200	4	4	5	1	3	3	5	3	3	1	2	5	3	7
201	4	2	2	2	4	2	2	4	4	2	6	7	5	3
202	3	4	4	2	3	4	4	4	3	3	7	7	4	4
203	3	3	2	3	3	4	5	5	3	4	5	5	5	5
204	3	3	3	3	3	3	3	3	3	3	4	4	4	4
205	5	4	3	4	3	4	3	5	3	3	7	6	7	1
206	4	3	3	3	3	3	3	3	3	3	4	6	4	4
207	2	4	3	2	4	3	2	4	4	5	2	5	4	2
208	4	4	4	4	4	4	4	4	4	4	6	6	6	2
209	4	4	4	4	4	3	4	4	4	3	2	5	2	2
210	3	4	2	.	3	2	2	4	3	4	7	5	2	1
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212	4	4	3	3	4	4	3	.	3	2	6	6	4	4
213	5	5	4	5	4	5	5	4	3	3	7	1	1	1
214	4	2	2	2	2	2	2	2	3	2	3	3	3	3
215	2	2	2	4	3	4	4	4	4	4	1	1	1	1
216	4	5	4	4	5	4	2	4	4	4	4	7	5	7
217	5	5	4	3	3	3	4	4	3	3	2	4	4	3
218	4	4	4	4	3	4	4	4	4	4	4	6	.	6
219	4	3	4	3	4	4	5	5	4	4	7	6	5	6

	OS5	OS6	OS7	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8	LC9	S	MEO
1	6	7	5	7	6	5	4	4	4	4	4	2	2	1
2	3	1	6	7	6	1	1	7	4	4	2	2	2	1
3	4	4	4	3	1	1	4	5	4	3	4	5	5	2
4	4	7	6	6	6	1	7	6	3	4	5	4	2	1
5	6	5	6	6	6	3	7	4	4	4	4	2	4	1
6	5	6	6	6	7	7	6	6	4	5	5	4	5	1
7	2	2	4	1	6	6	2	2	4	2	5	2	4	1
8	5	3	4	3	6	5	5	5	4	3	5	4	2	1
9	7	7	7	1	4	5	1	7	1	4	2	7	3	1
10	3	3	4	3	4	3	3	5	4	2	4	5	2	1
11	4	2	4	6	4	5	3	5	3	4	5	5	2	1
12	6	4	5	7	3	1	1	4	2	3	6	3	1	1
13	5	4	4	6	5	5	6	5	4	3	5	5	2	1
14	7	7	7	7	7	5	7	7	1	1	7	6	2	1
15	4	2	4	5	2	3	7	7	4	4	4	4	2	1
16	4	4	6	4	6	4	2	4	3	4	5	4	2	1
17	4	4	4	4	1	2	4	4	4	1	4	5	2	1
18	4	2	3	7	2	3	6	6	3	2	4	3	6	2
19	6	7	6	2	3	2	2	6	2	2	4	5	4	1
20	4	7	3	2	3	5	7	6	6	2	6	4	6	2
21	6	2	3	5	3	6	4	6	2	4	4	4	3	2
22	7	2	1	7	6	3	4	7	4	4	4	3	2	1
23	4	3	5	6	5	3	5	7	6	4	6	5	2	1
24	4	4	4	6	5	5	4	4	4	4	4	4	3	2
25	.	.	.	.	.	.	.	.	.	.	7	2	3	1
26	4	4	4	5	4	4	1	2	4	4	4	4	6	2
27	2	2	2	7	2	2	7	7	2	6	4	3	2	1
28	6	7	6	2	4	5	4	2	3	3	3	4	1	1
29	5	6	6	6	5	5	3	5	4	3	3	3	2	2
30	6	2	4	7	7	2	7	4	2	6	5	5	4	2
31	5	6	4	4	2	2	2	5	4	1	4	2	2	1
32	6	6	7	6	2	2	6	6	2	2	6	6	5	1
33	4	2	4	4	4	5	4	5	4	4	4	4	3	1
34	5	6	6	6	2	4	2	6	2	2	6	6	.	1
35	4	2	3	3	3	5	4	4	4	4	4	4	2	1
36	6	7	6	4	4	4	2	5	4	2	6	5	2	1
37	2	2	3	6	2	3	6	6	3	6	5	4	6	2
38	5	5	4	4	4	4	4	7	1	4	4	4	6	1
39	2	3	4	5	5	3	2	4	2	1	.	6	4	1
40	6	2	6	1	7	2	7	6	2	6	4	5	2	1
41	4	6	5	4	3	4	4	3	2	1	2	2	1	1
42	4	1	2	6	3	2	6	4	3	4	4	4	6	1
43	3	3	3	3	6	4	7	6	6	4	6	3	2	1
44	5	3	4	4	5	6	6	5	3	4	5	4	6	1
45	7	7	7	3	7	7	7	2	1	1	4	4	1	1
46	2	3	4	6	5	3	5	3	4	3	5	6	6	2
47	3	2	2	6	6	6	7	6	4	4	6	6	5	1
48	4	4	4	7	4	4	7	5	4	4	.	7	2	2
49	4	4	4	4	4	6	4	4	4	4	4	6	3	1
50	5	5	4	7	6	2	6	5	2	2	6	4	5	1
51	6	7	6	5	2	2	5	7	5	2	3	2	6	2
52	4	6	4	2	6	4	2	4	5	4	7	6	2	1
53	5	4	4	3	4	3	7	7	4	6	7	5	.	1
54	6	6	4	4	4	4	4	4	4	4	4	4	2	1
55	4	4	6	2	3	4	6	5	6	6	6	4	2	1

	OS5	OS6	OS7	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8	LC9	S	MEO
56	3	3	3	6	3	5	5	5	4	3	5	5	5	2
57	2	2	2	2	4	4	2	2	4	2	2	6	3	1
58	1	1	2	6	2	2	6	7	2	2	7	6	2	1
59	3	4	4	5	3	2	6	7	2	5	6	6	2	1
60	1	1	1	7	1	1	2	6	2	1	4	2	3	1
61	2	2	2	7	6	4	1	5	4	6	4	3	2	1
62	4	2	3	6	1	1	1	2	2	2	2	2	3	1
63	4	4	4	4	3	5	4	3	3	4	.	.	2	1
64	4	1	1	6	.	.	1	2	4	2	4	.	6	1
65	5	6	5	3	4	5	3	4	5	4	3	4	2	1
66	2	2	2	6	4	6	6	4	4	4	6	6	6	1
67	4	3	4	6	4	4	6	4	4	3	4	6	3	1
68	.	.	.	7	.	5	4	4	5	5	6	3	1	1
69	4	4	4	4	6	6	6	6	2	6	5	5	2	1
70	5	3	4	4	7	6	5	5	6	5	4	6	2	1
71	4	7	1	4	3	2	4	4	1	4	4	4	6	1
72	1	2	2	5	2	2	6	5	5	5	1	7	2	1
73	1	1	2	1	2	2	1	3	2	2	1	2	1	2
74	4	4	4	5	4	4	3	4	3	4	4	4	5	1
75	7	5	1	3	6	2	3	6	5	3	4	5	.	1
76	2	2	2	2	7	5	4	2	3	3	7	5	.	1
77	1	1	2	6	6	4	6	6	6	6	4	4	6	1
78	3	4	4	5	4	6	2	3	6	5	6	5	6	1
79	3	6	6	6	2	2	2	2	2	2	6	6	2	2
80	1	2	2	6	6	6	2	6	4	2	6	6	6	1
81	1	2	2	2	1	4	7	6	3	4	6	6	2	1
82	4	3	4	6	3	2	5	2	5	2	2	.	2	1
83	2	2	2	5	.	2	7	1	5	4	2	4	2	1
84	3	4	4	3	5	3	4	4	4	4	4	.	1	2
85	1	1	1	1	3	1	7	7	3	1	3	7	2	2
86	5	5	7	7	5	6	6	5	5	5	5	5	4	1
87	6	4	6	2	2	4	4	4	2	2	2	4	4	1
88	2	6	4	4	2	2	4	4	4	2	3	6	6	1
89	4	5	3	5	6	5	5	4	3	4	6	3	2	1
90	4	3	4	4	1	3	4	4	3	4	4	4	4	1
91	6	6	4	4	4	5	4	6	5	2	6	3	2	1
92	2	1	2	2	2	2	4	6	2	4	1	7	2	1
93	3	3	4	7	4	5	4	4	4	6	6	5	3	1
94	5	6	5	5	3	5	1	4	6	6	3	4	1	1
95	4	2	3	4	4	3	4	4	4	4	.	4	3	1
96	2	5	2	6	2	2	2	5	2	2	2	6	3	1
97	2	2	4	4	4	3	4	3	4	4	4	3	1	2
98	2	3	2	4	3	5	3	5	3	6	6	6	2	1
99	1	1	2	4	7	7	7	6	4	5	7	5	2	1
100	2	3	2	4	3	5	3	5	3	6	6	6	2	1
101	4	4	4	6	2	2	7	1	1	1	1	5	6	1
102	6	5	5	4	5	3	4	4	3	3	5	4	3	1
103	3	3	3	3	2	4	3	3	3	3	3	3	6	1
104	2	1	1	7	7	2	1	1	1	1	7	7	3	1
105	5	6	5	6	5	5	3	5	2	2	3	5	3	1
106	6	5	6	2	2	2	1	6	1	1	4	3	1	2
107	7	7	7	1	1	1	7	2	4	4	4	7	2	1
108	4	4	4	6	2	2	7	6	3	6	7	4	2	1
109	3	3	5	3	3	2	4	5	3	5	5	4	1	1
110	4	5	4	3	5	3	5	5	4	3	5	3	4	2

	OS5	OS6	OS7	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8	LC9	S	MEO
111	6	6	6	7	7	7	7	6	7	7	4	7	4	1
112	4	5	6	6	6	4	6	5	5	7	6	5	3	1
113	5	2	6	3	5	2	6	2	5	2	5	1	5	2
114	5	4	6	6	5	3	7	6	2	2	3	6	3	1
115	4	2	7	4	4	1	2	3	4	5	2	1	2	1
116	1	1	1	7	7	6	7	7	1	1	7	1	6	1
117	5	5	3	7	1	3	7	6	3	7	6	5	2	1
118	5	4	4	1	4	4	7	7	7	4	4	7	6	1
119	3	4	4	6	3	5	4	4	3	3	3	5	2	1
120	2	2	3	7	6	6	2	6	6	3	6	5	5	1
121	2	2	4	4	6	3	7	6	2	2	6	6	5	1
122	1	1	5	2	1	3	6	6	2	2	6	2	2	1
123	5	3	4	2	2	4	4	4	4	5	4	3	2	1
124	5	6	5	5	7	7	3	2	4	2	3	6	3	1
125	6	6	6	7	6	1	7	1	6	2	1	5	2	2
126	1	1	4	6	7	7	7	4	1	7	4	4	2	1
127	2	4	2	4	2	3	2	2	4	4	2	6	1	1
128	5	2	3	3	4	5	6	3	4	3	3	5	3	1
129	5	5	5	5	4	4	4	4	3	3	3	4	3	1
130	6	3	3	4	2	2	1	1	2	1	4	3	3	1
131	5	6	5	6	5	6	5	6	5	6	7	5	2	2
132	7	7	7	3	3	2	6	4	1	7	7	7	2	1
133	2	3	5	6	6	3	3	4	4	4	4	6	3	1
134	2	5	3	4	3	3	4	4	5	2	2	4	2	1
135	3	3	3	4	4	4	4	2	3	3	3	3	2	2
136	2	1	3	1	1	6	1	2	5	5	6	2	.	1
137	5	2	6	6	2	5	1	2	2	1	1	2	2	1
138	3	3	3	4	3	5	5	4	5	5	4	3	2	1
139	1	5	2	1	1	7	4	4	2	4	6	7	3	1
140	7	4	3	1	7	4	1	1	1	1	7	7	2	1
141	2	3	4	4	4	4	3	3	4	4	3	7	2	1
142	3	3	6	5	4	5	5	5	4	5	4	5	2	1
143	6	5	4	6	5	4	3	4	2	2	3	4	3	1
144	4	4	4	4	5	4	4	4	4	4	4	4	2	1
145	1	3	3	3	5	5	5	6	3	2	3	3	2	1
146	6	6	6	7	7	3	4	4	4	2	5	4	3	1
147	3	6	4	4	2	6	4	4	6	2	5	4	6	1
148	2	3	3	5	2	3	5	3	2	6	3	6	3	1
149	5	2	4	6	7	5	4	2	4	2	4	3	2	1
150	2	4	4	7	3	1	7	4	4	5	4	5	2	2
151	2	2	2	2	5	3	5	2	1	7	2	6	3	1
152	5	5	4	5	5	2	2	3	3	3	2	5	2	2
153	3	3	3	6	4	6	2	2	2	2	5	5	2	1
154	4	5	3	4	3	2	2	5	3	3	3	5	4	2
155	1	1	1	7	7	6	2	2	2	3	2	4	1	1
156	7	7	7	4	4	1	7	7	1	1	1	7	5	1
157	4	5	5	3	2	2	2	4	2	2	4	4	6	1
158	6	6	6	6	3	3	1	7	1	1	2	5	6	1
159	5	6	5	4	6	4	5	2	3	6	5	2	6	1
160	2	2	2	6	6	7	1	2	4	6	4	2	2	1
161	2	2	2	6	6	2	5	2	5	2	2	6	5	1
162	5	3	5	5	2	2	5	5	5	2	3	5	4	2
163	4	6	5	3	2	3	4	2	2	3	3	4	3	1
164	1	2	1	7	4	2	1	6	7	1	7	1	2	1
165	1	1	1	7	6	7	2	2	2	6	6	6	2	1

	OS5	OS6	OS7	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8	LC9	S	MEO
166	5	4	4	7	2	2	7	6	4	4	4	4	5	1
167	7	5	6	6	5	6	5	6	5	7	6	5	3	1
168	4	3	5	5	6	7	3	4	3	2	4	5	4	2
169	5	3	4	4	6	4	4	3	4	3	4	4	2	1
170	2	2	2	4	4	6	2	4	4	5	4	3	2	1
171	5	6	5	7	3	3	6	6	5	6	5	6	3	2
172	3	4	1	7	4	4	7	2	4	3	7	3	3	1
173	2	2	2	6	6	5	2	5	3	5	3	4	2	1
174	2	2	2	5	5	5	4	4	2	6	5	2	5	1
175	2	1	2	6	6	3	2	4	2	2	5	4	2	1
176	5	4	5	4	6	6	4	3	3	.	4	4	2	1
177	3	4	3	3	5	3	5	2	5	6	5	3	1	1
178	2	2	4	1	7	5	6	7	4	1	6	4	6	2
179	4	4	5	7	4	4	6	4	4	4	4	4	4	1
180	7	7	5	4	7	4	6	6	6	2	4	4	2	1
181	2	2	2	3	4	6	4	5	4	4	4	3	6	1
182	2	4	4	4	4	4	4	4	3	2	4	3	2	1
183	2	3	3	2	3	2	3	3	3	3	.	.	6	1
184	4	4	4	7	7	5	4	6	6	6	6	5	1	1
185	5	6	6	5	6	6	5	5	5	4	5	4	4	1
186	1	1	4	7	1	2	7	7	1	1	.	.	6	1
187	7	7	7	7	4	3	6	4	.	2	1	.	2	1
188	.	.	.	5	5	6	1	2	1	1	5	5	2	1
189	7	2	4	2	2	2	4	2	3	3	6	6	2	1
190	4	4	4	3	3	3	3	3	3	3	3	3	2	1
191	2	2	3	3	4	3	3	4	2	3	3	3	2	1
192	2	2	2	3	6	6	6	4	6	6	6	4	2	1
193	.	.	.	6	6	2	6	6	4	2	2	6	2	1
194	5	4	2	5	6	6	1	6	4	2	5	2	3	1
195	4	4	4	4	4	6	4	5	6	4	6	6	2	1
196	5	5	4	5	6	6	4	5	6	4	6	6	2	1
197	2	3	6	4	7	2	4	3	3	6	6	5	6	1
198	7	7	7	2	3	7	7	2	4	3	2	1	2	1
199	5	1	4	7	4	1	1	5	2	2	4	2	3	1
200	3	1	4	2	6	3	2	4	1	4	6	2	3	1
201	1	2	1	7	1	7	6	6	2	6	1	6	2	1
202	4	4	4	6	4	4	7	4	1	4	4	4	2	1
203	5	5	5	3	3	2	3	2	3	3	3	4	2	2
204	4	4	4	4	4	4	4	4	4	4	4	4	1	2
205	4	6	7	7	1	4	6	5	1	4	2	6	3	1
206	4	4	4	4	5	4	3	4	4	4	4	3	2	1
207	3	2	3	6	6	5	7	2	5	5	4	3	2	1
208	5	1	6	6	2	2	6	2	6	6	2	6	3	1
209	5	4	4	6	6	6	5	5	4	2	5	4	3	1
210	7	7	7	5	7	7	3	6	3	3	6	7	6	1
211	3	3	6	4	4	4	4	6	4	4	3	3	2	1
212	5	5	3	4	4	6	5	6	2	3	4	5	2	1
213	1	1	1	1	1	1	1	1	1	1	1	1	1	2
214	3	4	4	4	4	4	2	4	4	2	3	2	2	1
215	1	1	1	7	4	4	1	1	4	7	4	7	2	1
216	6	4	6	7	6	7	4	4	3	3	4	7	3	1
217	4	4	3	7	1	7	5	6	4	1	4	4	6	1
218	6	6	6	6	6	4	4	4	4	4	5	5	3	1
219	5	5	6	6	6	4	4	6	2	4	4	4	3	2

	COS	AR	NOE	OS	OC	L	LC	P	FS	LCL	LCF	PPC	PHY	KMS
1	3	2	1	40	50	19	40	8	2	40	.	.	8	2
2	3	2	3	34	36	20	34	8	3	34	.	.	8	2
3	3	2	1	34	44	20	30	6	2	.	30	.	6	2
4	3	2	2	38	37	16	42	4	2	42	.	.	4	2
5	2	1	1	42	41	22	40	8	1	40	.	.	8	2
6	3	4	3	35	34	15	50	4	4	50	.	4	.	1
7	2	2	2	28	41	19	30	6	2	30	.	.	6	2
8	2	1	1	29	36	22	40	4	1	40	.	.	4	2
9	3	1	1	49	48	12	32	10	1	32	.	.	10	2
10	5	2	3	28	37	18	33	7	3	33	.	.	7	2
11	2	1	1	26	43	23	40	7	1	40	.	.	7	2
12	2	1	1	38	43	17	30	5	1	30	.	.	5	2
13	3	1	1	32	43	23	44	4	1	44	.	4	.	1
14	2	1	1	43	41	22	48	6	1	48	.	6	.	1
15	4	2	3	33	39	25	40	8	3	40	.	.	8	2
16	3	2	2	32	39	13	36	6	2	36	.	.	6	2
17	3	2	2	36	44	27	29	8	2	29	.	.	8	2
18	6	6	6	30	42	29	36	8	6	.	36	.	8	2
19	5	5	4	44	39	22	28	9	5	28	.	.	9	2
20	2	2	1	34	42	20	41	7	2	.	41	.	7	2
21	3	3	3	35	40	24	38	8	3	.	38	.	8	2
22	3	.	2	34	47	22	42	.	.	42	.	.	.	2
23	3	3	4	38	35	16	47	9	4	47	.	9	.	1
24	6	6	5	29	13	13	40	7	6	.	40	.	7	2
25	5	6	6	.	43	30	.	.	6	.	.	.	.	.
26	6	3	4	29	33	23	32	7	4	.	32	.	7	2
27	2	1	1	22	40	12	40	.	1	40	.	.	.	2
28	2	1	1	43	44	20	30	6	1	30	.	.	6	2
29	6	2	2	41	37	23	37	6	2	.	37	.	6	2
30	6	6	6	38	43	24	45	7	6	.	45	7	.	1
31	.	.	.	39	44	13	26	8	.	26	.	.	8	2
32	3	3	6	43	35	24	38	8	5	38	.	.	8	2
33	2	2	2	30	37	19	38	8	2	38	.	.	8	2
34	2	1	1	40	43	22	36	7	1	36	.	.	7	2
35	3	2	1	30	39	24	35	8	2	35	.	.	8	2
36	2	1	2	45	33	23	36	6	2	36	.	.	6	2
37	5	3	2	29	38	24	41	8	3	.	41	.	8	2
38	4	5	5	36	38	26	36	9	5	36	.	.	9	2
39	5	2	5	34	36	21	.	8	4	.	.	.	.	.
40	3	2	2	40	42	24	40	7	2	40	.	.	7	2
41	2	1	1	40	48	28	25	6	1	25	.	.	6	2
42	3	2	6	28	36	21	36	8	4	36	.	.	8	2
43	2	1	1	24	42	24	45	.	1	45	.	.	.	1
44	3	3	3	31	37	24	42	7	3	42	.	.	7	2
45	3	2	3	49	49	22	36	8	3	36	.	.	8	2
46	6	4	5	23	39	22	40	8	5	.	40	.	8	2
47	2	1	1	25	46	26	51	5	1	51	.	5	.	1
48	3	1	1	40	39	21	.	6	1	.	.	.	.	.
49	6	2	6	32	37	21	40	7	4	40	.	.	7	2
50	5	5	4	37	39	21	40	8	5	40	.	.	8	2
51	3	5	.	45	42	25	33	9	.	.	33	.	9	2
52	3	2	2	35	42	15	40	7	2	40	.	.	7	2
53	6	4	3	35	43	24	46	7	4	46	.	7	.	1
54	3	2	3	44	42	20	36	7	3	36	.	.	7	2
55	2	1	1	36	44	26	42	5	1	42	.	.	5	2

	COS	AR	NOE	OS	OC	L	LC	P	FS	LCL	LCF	PPC	PHY	KMS
56	6	5	4	24	35	18	41	6	5	.	41	.	6	2
57	3	2	1	26	41	24	28	6	2	28	.	.	6	2
58	3	2	3	26	40	28	40	10	3	40	.	.	10	2
59	3	1	2	31	47	22	42	8	2	42	.	.	8	2
60	6	3	6	15	47	30	26	10	5	26	.	.	10	2
61	3	3	3	26	38	22	40	10	3	40	.	.	10	2
62	3	1	1	32	42	26	19	9	1	19	.	9	.	1
63	3	2	3	25	30	16	.	8	3	.	.	.	.	.
64	5	6	6	16	43	27	.	4	6	.	.	.	.	.
65	5	6	6	32	31	21	35	8	6	35	.	.	8	2
66	3	2	2	26	31	18	46	6	2	46	.	6	.	1
67	3	3	5	32	45	24	41	10	4	41	.	.	10	2
68	5	3	5	.	37	28	.	6	4	.	.	.	.	.
69	1	2	2	28	38	24	46	7	2	46	.	7	.	1
70	3	3	2	34	43	24	48	7	3	48	.	7	.	1
71	4	4	3	27	37	17	30	8	4	30	.	.	8	2
72	3	3	2	12	37	23	38	7	3	38	.	.	7	2
73	4	3	6	10	48	17	16	8	5	.	16	8	.	1
74	6	1	2	28	.	18	35	6	2	35	.	.	6	2
75	.	3	3	33	43	22	37	10	3	37	.	.	10	2
76	6	5	4	27	50	22	38	10	5	38	.	.	10	2
77	3	1	3	14	41	19	48	5	2	48	.	5	.	1
78	6	5	4	30	31	19	42	7	5	42	.	.	7	2
79	5	2	2	36	37	22	30	10	2	.	30	.	10	2
80	5	6	6	14	33	23	44	4	6	44	.	4	.	1
81	6	2	6	16	28	16	39	6	4	39	.	.	6	2
82	3	3	2	31	47	17	.	6	3	.	.	.	.	.
83	4	2	2	17	31	23	.	7	2	.	.	.	.	.
84	6	4	4	24	38	16	.	6	4	.	.	.	.	.
85	3	2	3	7	32	23	33	10	3	.	33	.	10	2
86	3	3	5	37	44	22	49	6	4	49	.	6	.	1
87	6	4	6	32	40	24	26	10	5	26	.	.	10	2
88	3	4	6	30	40	23	31	.	5	31	.	.	.	2
89	3	2	2	26	34	18	41	6	2	41	.	.	6	2
90	5	6	6	33	28	14	31	7	6	31	.	.	7	2
91	4	2	3	32	39	30	39	.	3	39	.	.	.	2
92	4	3	3	18	35	21	30	9	3	30	.	.	9	2
93	.	2	3	30	39	22	45	6	3	45	.	6	.	1
94	3	2	6	30	24	16	37	6	4	37	.	.	6	2
95	2	1	1	31	33	24	.	7	1	.	.	.	.	.
96	3	3	3	22	42	25	29	8	3	29	.	.	8	2
97	6	6	6	25	32	18	33	6	6	.	33	.	6	2
98	3	2	1	18	31	22	41	8	2	41	.	.	8	2
99	3	2	2	12	28	28	52	9	2	52	.	9	.	1
100	4	2	3	18	31	22	41	8	3	41	.	.	8	2
101	6	6	6	32	43	30	26	7	6	26	.	.	7	2
102	2	6	2	36	30	18	35	6	4	35	.	.	6	2
103	3	2	6	18	32	16	27	7	4	27	.	.	7	2
104	6	2	5	26	49	28	34	8	4	34	.	.	8	2
105	3	1	1	34	30	23	36	8	1	36	.	.	8	2
106	6	6	5	41	39	23	22	9	6	.	22	.	9	2
107	3	1	1	43	33	12	31	10	1	31	.	.	10	2
108	2	2	2	36	41	21	43	8	2	43	.	8	.	1
109	3	1	2	31	37	22	34	.	2	34	.	.	.	2
110	6	6	6	30	39	19	36	8	6	.	36	.	8	2

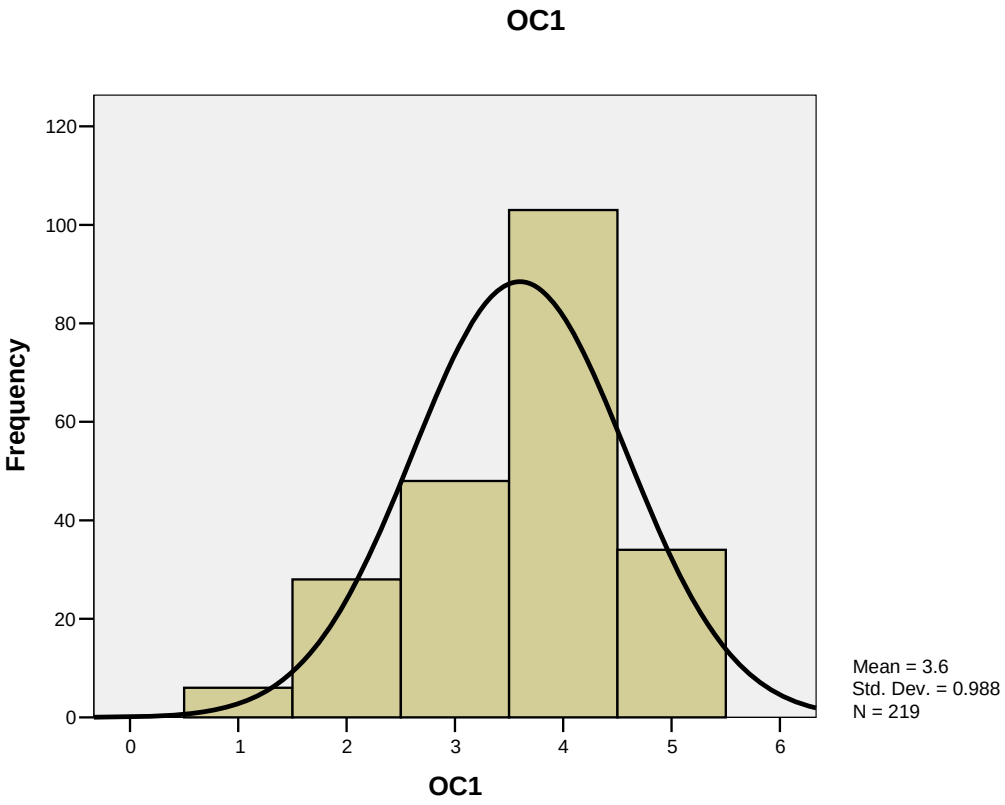
	COS	AR	NOE	OS	OC	L	LC	P	FS	LCL	LCF	PPC	PHY	KMS
111	6	5	2	42	42	23	59	8	4	59	.	8	.	1
112	3	5	4	39	40	20	50	6	5	50	.	6	.	1
113	5	5	4	28	31	19	31	3	5	.	31	.	3	2
114	5	4	4	38	37	18	40	9	4	40	.	.	9	2
115	4	2	3	29	42	11	26	6	3	26	.	.	6	2
116	3	6	6	.	32	23	44	6	6	44	.	6	.	1
117	3	2	2	33	34	16	45	8	2	45	.	8	.	1
118	3	4	3	35	49	24	45	8	4	45	.	8	.	1
119	3	3	3	26	36	24	36	8	3	36	.	.	8	2
120	4	2	6	23	37	17	47	8	4	47	.	8	.	1
121	3	2	3	28	42	22	42	9	3	42	.	.	9	2
122	3	3	2	25	36	20	30	4	3	30	.	.	4	2
123	2	1	1	33	40	20	32	8	1	32	.	.	8	2
124	3	2	5	38	38	23	39	8	4	39	.	.	8	2
125	4	2	2	39	32	24	36	8	2	.	36	.	8	2
126	3	2	1	31	31	20	47	8	2	47	.	8	.	1
127	3	3	3	25	44	25	29	7	3	29	.	.	7	2
128	5	3	5	26	38	15	36	7	4	36	.	.	7	2
129	6	2	3	33	28	18	34	7	3	34	.	.	7	2
130	3	3	3	26	50	24	20	10	3	20	.	10	.	1
131	4	5	4	38	41	23	51	7	5	.	51	7	.	1
132	2	2	1	45	28	10	40	4	2	40	.	.	4	2
133	3	1	4	24	47	23	40	8	3	40	.	.	8	2
134	3	2	2	28	41	21	31	7	2	31	.	.	7	2
135	3	1	1	26	33	15	30	6	1	.	30	.	6	2
136	3	2	6	12	35	25	29	4	4	29	.	.	4	2
137	3	5	4	33	45	26	22	9	5	22	.	.	9	2
138	3	2	3	20	26	20	38	5	3	38	.	.	5	2
139	6	2	5	26	45	19	36	6	4	36	.	.	6	2
140	3	2	3	37	39	30	30	9	3	30	.	.	9	2
141	1	1	1	30	39	28	36	6	1	36	.	.	6	2
142	3	2	2	32	38	23	42	8	2	42	.	.	8	2
143	3	1	1	35	42	19	33	8	1	33	.	.	8	2
144	3	2	2	31	44	19	37	8	2	37	.	.	8	2
145	5	2	3	22	39	23	35	6	3	35	.	.	6	2
146	3	3	3	42	43	25	40	10	3	40	.	.	10	2
147	6	6	6	29	24	20	37	6	6	37	.	.	6	2
148	3	2	3	22	42	22	35	7	3	35	.	.	7	2
149	3	3	2	28	42	12	37	10	3	37	.	.	10	2
150	4	3	2	18	39	9	40	10	3	.	40	.	10	2
151	3	2	1	27	36	23	33	7	2	33	.	.	7	2
152	6	3	5	35	39	20	30	8	4	.	30	.	8	2
153	3	3	2	25	37	24	34	8	3	34	.	.	8	2
154	3	3	5	34	41	.	30	8	4	.	30	.	8	2
155	6	2	5	16	32	24	35	8	4	35	.	.	8	2
156	2	2	2	37	50	30	33	10	2	33	.	.	10	2
157	3	2	3	37	42	27	25	8	3	25	.	.	8	2
158	1	4	3	43	43	27	29	8	4	29	.	.	8	2
159	6	4	6	39	39	18	37	5	5	37	.	.	5	2
160	2	1	1	18	45	10	38	3	1	38	.	.	3	2
161	5	6	6	14	39	24	36	.	6	36	.	.	.	2
162	6	2	2	35	38	16	34	8	2	.	34	.	8	2
163	2	1	1	30	33	22	26	9	1	26	.	.	9	2
164	3	3	3	10	41	30	36	9	3	36	.	.	9	2
165	4	2	2	8	27	20	44	6	2	44	.	6	.	1

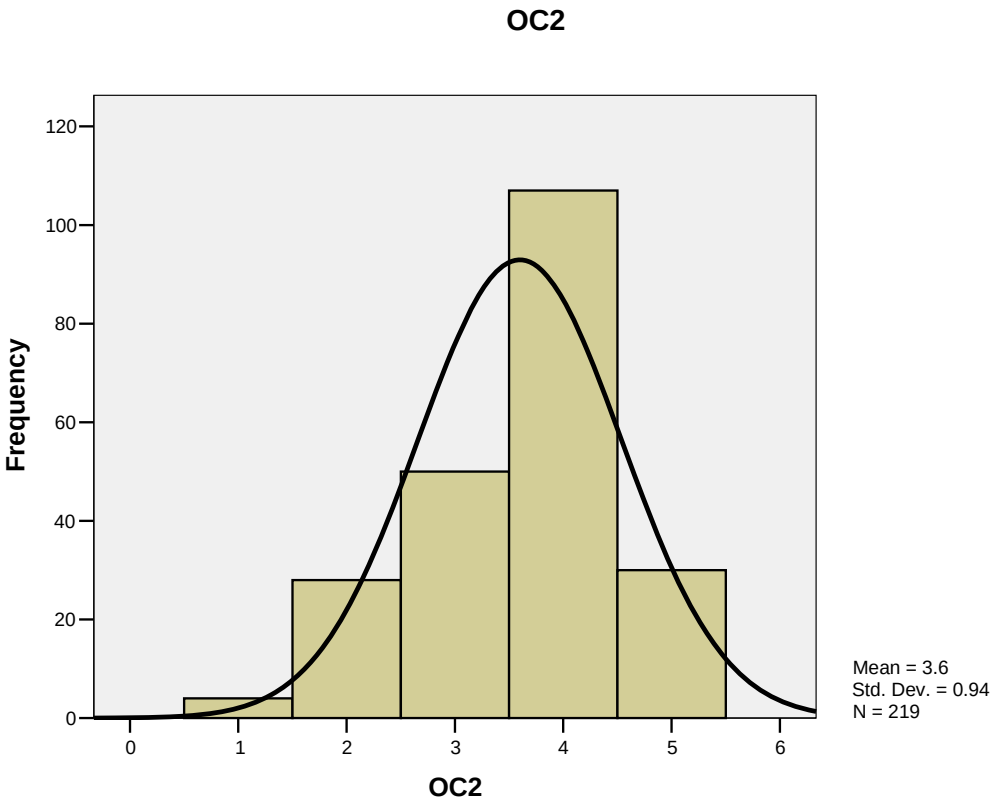
	COS	AR	NOE	OS	OC	L	LC	P	FS	LCL	LCF	PPC	PHY	KMS
166	3	4	3	38	50	27	40	10	4	40	.	.	10	2
167	6	3	4	41	43	26	51	.	4	51	.	.	.	1
168	6	6	5	34	31	21	39	6	6	.	39	.	6	2
169	2	1	2	30	32	20	36	6	2	36	.	.	6	2
170	3	3	2	19	43	30	36	10	3	36	.	.	10	2
171	5	3	4	37	36	20	47	8	4	.	47	8	.	1
172	3	1	2	27	32	17	41	8	2	41	.	.	8	2
173	4	3	3	14	33	21	39	10	3	39	.	.	10	2
174	2	1	1	15	33	22	38	4	1	38	.	.	4	2
175	3	2	2	21	41	20	34	8	2	34	.	.	8	2
176	3	2	3	28	37	23	.	6	3	.	.	.	.	.
177	2	1	2	25	26	15	37	5	2	37	.	.	5	2
178	6	4	6	31	37	23	41	9	5	.	41	.	9	2
179	3	4	1	.	37	24	41	8	3	41	.	.	8	2
180	2	1	1	41	27	15	43	4	1	43	.	4	.	1
181	3	3	6	12	34	21	37	6	5	37	.	.	6	2
182	2	2	2	26	31	18	32	7	2	32	.	.	7	2
183	3	4	3	17	29	19	.	7	4	.	.	.	.	.
184	2	1	1	31	38	20	52	6	1	52	.	6	.	1
185	3	4	5	39	39	20	45	8	5	45	.	8	.	1
186	3	4	4	22	40	23	.	8	4	.	.	.	.	.
187	2	1	1	45	26	16	.	7	1	.	.	.	.	.
188	3	3	1	.	34	22	31	.	2	31	.	.	.	2
189	3	2	2	34	32	20	30	2	2	30	.	.	2	2
190	3	4	4	27	32	20	27	8	4	27	.	.	8	2
191	4	4	3	19	27	22	28	7	4	28	.	.	7	2
192	2	1	1	20	36	20	47	6	1	47	.	6	.	1
193	2	1	2	.	36	22	40	.	2	40	.	.	.	2
194	3	1	1	26	33	20	37	6	1	37	.	.	6	2
195	3	2	2	33	36	23	45	.	2	45	.	.	.	1
196	3	3	2	35	29	19	48	7	3	48	.	7	.	1
197	2	2	3	26	28	12	40	5	3	40	.	.	5	2
198	3	1	1	42	22	17	31	5	1	31	.	.	5	2
199	3	5	3	27	43	21	28	10	4	28	.	.	10	2
200	3	3	3	25	35	20	30	4	3	30	.	.	4	2
201	2	1	1	25	38	16	42	6	1	42	.	.	6	2
202	3	1	1	34	31	21	38	6	1	38	.	.	6	2
203	3	4	4	35	31	22	26	7	4	.	26	.	7	2
204	6	2	2	28	31	18	36	6	2	.	36	.	6	2
205	4	3	1	38	37	22	36	6	2	36	.	.	6	2
206	2	1	1	30	40	18	35	6	1	35	.	.	6	2
207	3	2	2	21	37	18	43	9	2	43	.	9	.	1
208	6	4	5	32	38	24	38	8	5	38	.	.	8	2
209	3	1	1	24	41	23	43	7	1	43	.	7	.	1
210	3	6	3	36	24	.	47	7	5	47	.	7	.	1
211	2	3	4	27	31	21	36	6	4	36	.	.	6	2
212	3	2	3	33	38	.	39	5	3	39	.	.	5	2
213	3	4	3	13	43	27	9	6	4	.	9	6	.	1
214	2	1	1	23	27	12	29	5	1	29	.	.	5	2
215	3	1	2	7	33	21	39	8	2	39	.	.	8	2
216	3	3	1	39	44	23	45	8	2	45	.	8	.	1
217	3	2	1	24	30	21	39	6	2	39	.	.	6	2
218	3	1	3	.	40	23	42	8	2	42	.	.	8	2
219	2	2	2	40	43	25	40	8	2	.	40	.	8	2

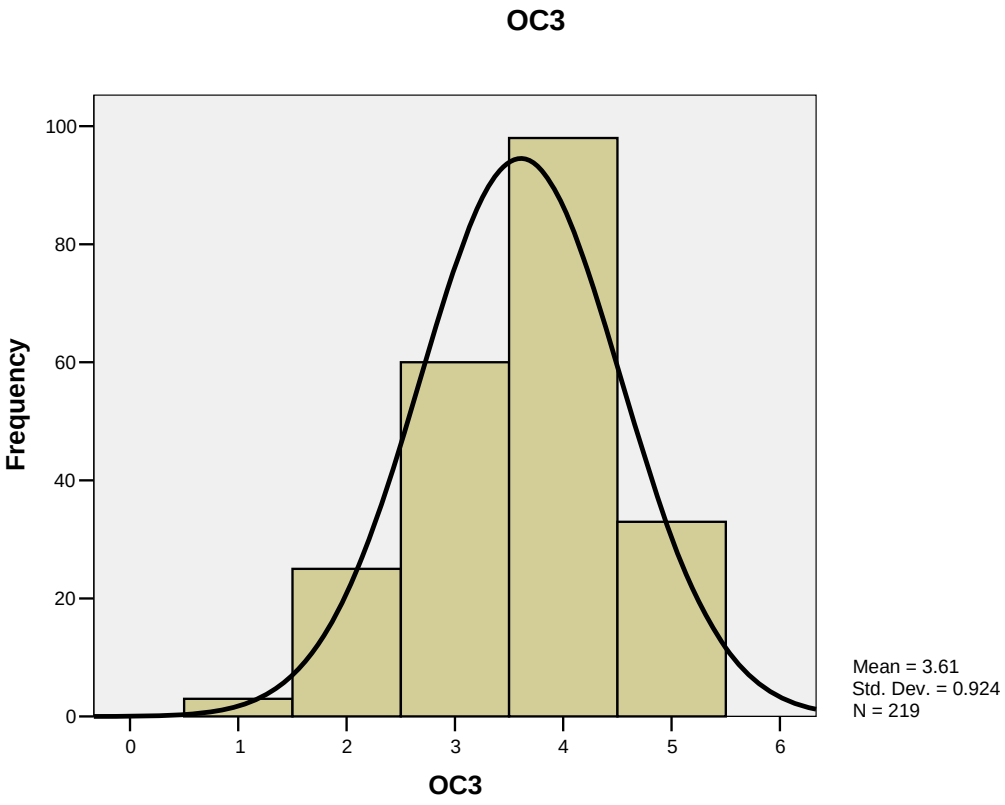
APPENDIX D: SPSS OUTPUTS

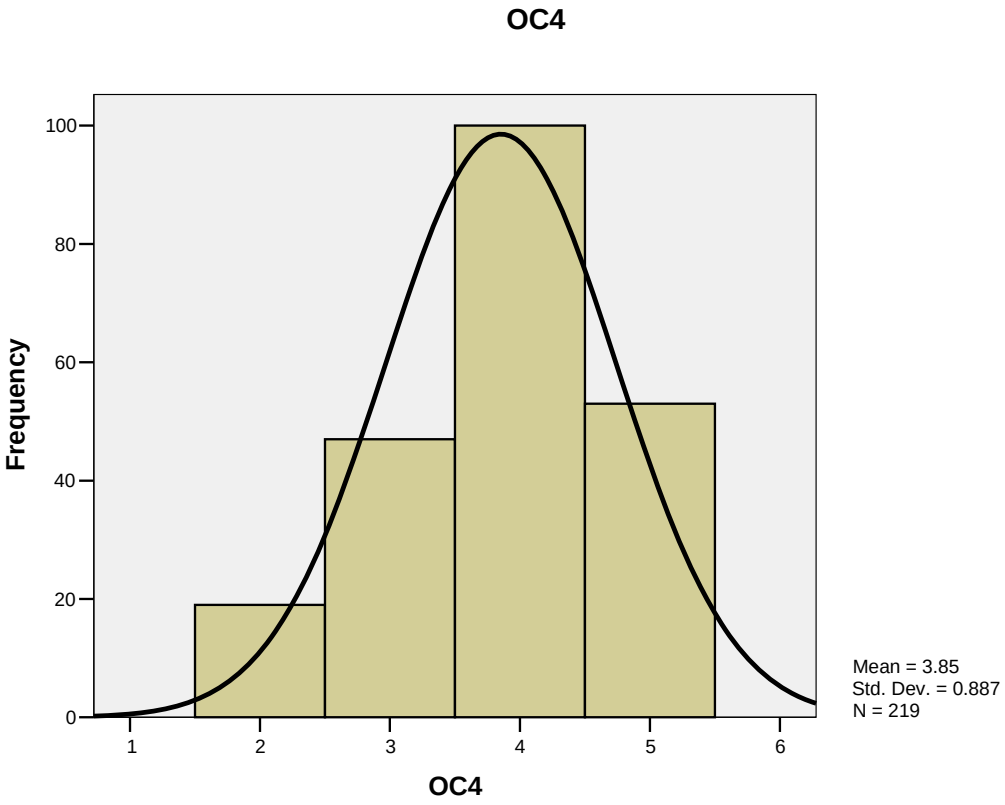
Appendix D1: Descriptive statistics for scale variables

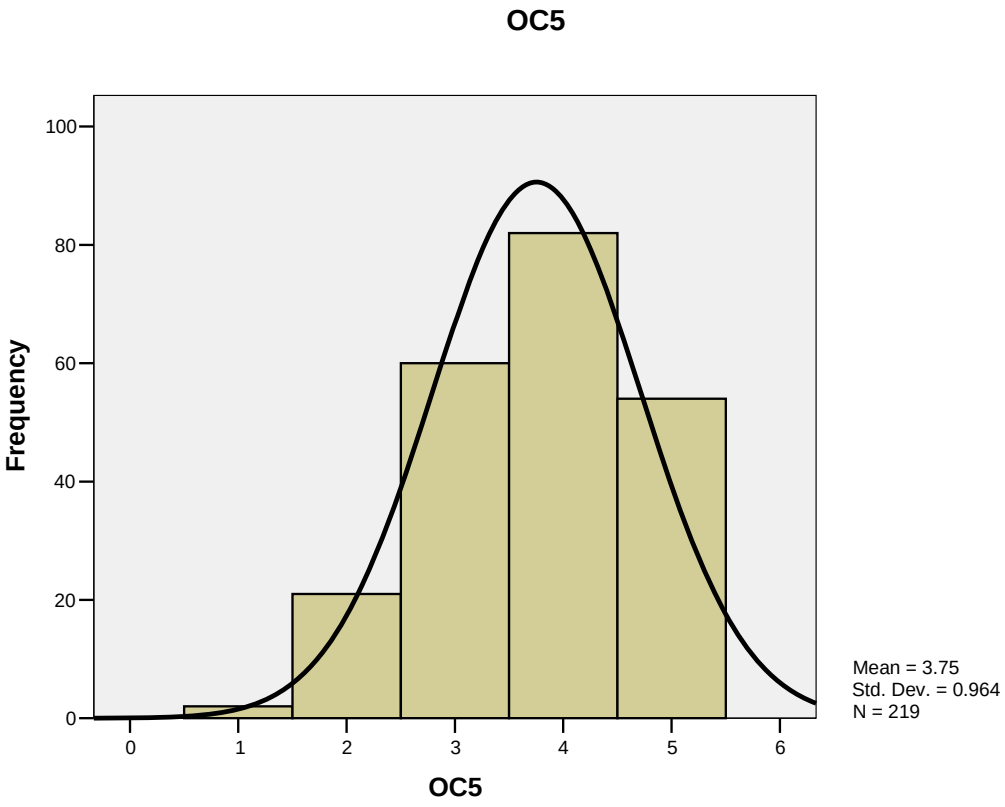
	N		Mean	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
	Valid	Missing						
OC1	219	0	3.60	.988	-.622	-.087	1	5
OC2	219	0	3.60	.940	-.588	-.083	1	5
OC3	219	0	3.61	.924	-.442	-.198	1	5
OC4	219	0	3.85	.887	-.467	-.439	2	5
OC5	219	0	3.75	.964	-.386	-.514	1	5
OC6	218	1	3.89	.931	-.737	.270	1	5
OC7	219	0	3.90	.990	-.741	.060	1	5
OC8	219	0	3.27	1.115	-.188	-.808	1	5
OC9	219	0	4.08	.923	-1.003	.814	1	5
OC10	219	0	4.08	.795	-.749	.685	1	5
OC11	217	2	3.67	1.005	-.456	-.521	1	5
OC12	219	0	3.75	.927	-.596	.196	1	5
OC13	218	1	3.94	.929	-.899	.737	1	5
L1	219	0	3.48	1.006	-.488	-.330	1	5
L2	219	0	3.56	.972	-.508	-.347	1	5
L3	219	0	3.79	.882	-.758	.560	1	5
L4	219	0	3.48	.974	-.574	-.147	1	5
L5	218	1	3.37	1.008	-.461	-.288	1	5
L6	219	0	3.85	.830	-.441	.001	1	5
L7	218	1	3.34	.963	-.362	-.216	1	5
L8	218	1	3.26	1.090	-.288	-.543	1	5
L9	217	2	3.83	.913	-.623	.198	1	5
P1	209	10	3.62	.870	-.410	.138	1	5
P2	207	12	3.55	.912	-.370	.145	1	5
OS1	216	3	4.82	1.825	-.582	-.759	1	7
OS2	214	5	4.74	1.708	-.624	-.589	1	7
OS3	213	6	4.38	1.634	-.353	-.667	1	7
OS4	215	4	4.37	1.655	-.366	-.637	1	7
OS5	215	4	3.85	1.731	.014	-.939	1	7
OS6	215	4	3.71	1.814	.245	-.999	1	7
OS7	215	4	3.96	1.620	.021	-.710	1	7
LC1	218	1	4.67	1.778	-.382	-.854	1	7
LC2	215	4	4.16	1.797	-.076	-1.070	1	7
LC3	217	2	3.89	1.702	.117	-.990	1	7
LC4	218	1	4.23	1.925	-.111	-1.082	1	7
LC5	218	1	4.34	1.645	-.211	-.859	1	7
LC6	217	2	3.44	1.439	.130	-.513	1	7
LC7	217	2	3.52	1.645	.290	-.778	1	7
LC8	213	6	4.26	1.556	-.150	-.584	1	7
LC9	212	7	4.37	1.517	-.149	-.619	1	7
Valid N (listwise)	186							

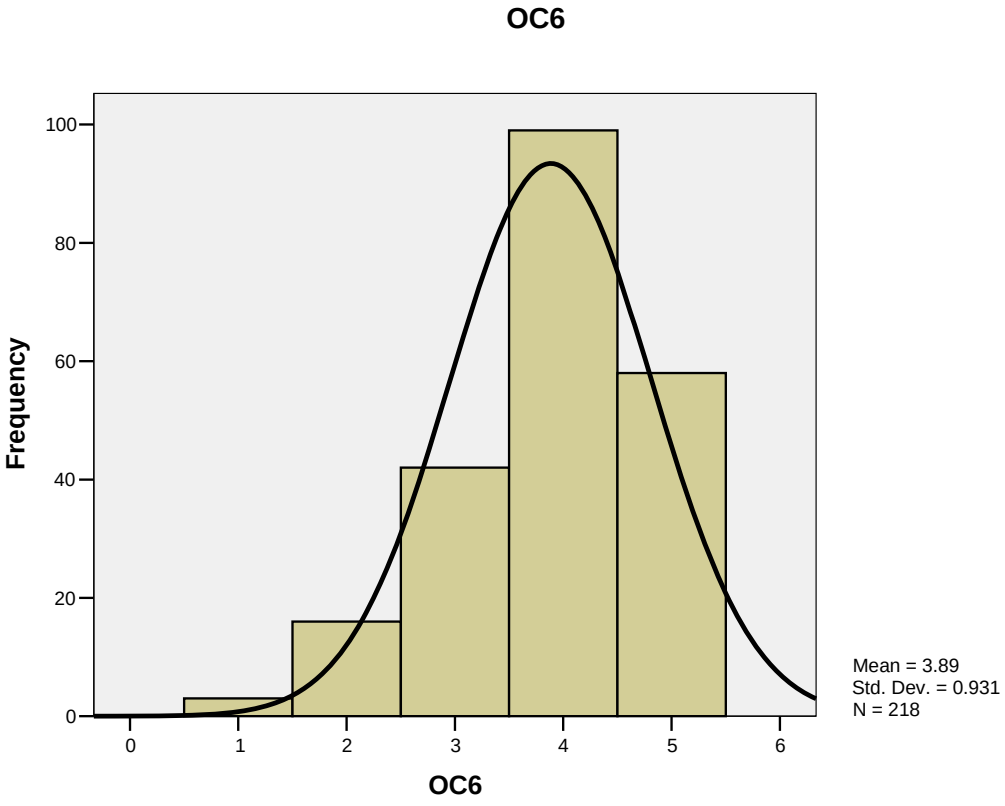

OC1
Frequency
120
100
80
60
40
20
0
0
1
2
3
4
5
6
OC1
Mean = 3.6
Std. Dev. = 0.988
N = 219

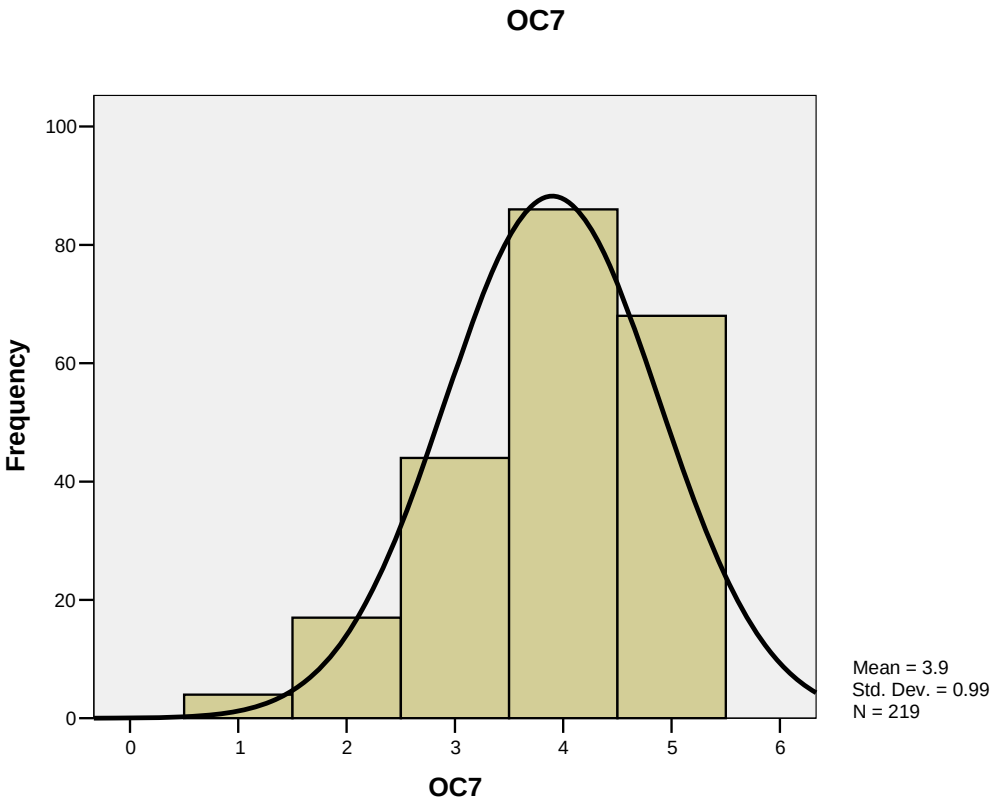

OC2
Frequency
120
100
80
60
40
20
0
0
1
2
3
4
5
6
OC2
Mean = 3.6
Std. Dev. = 0.94
N = 219

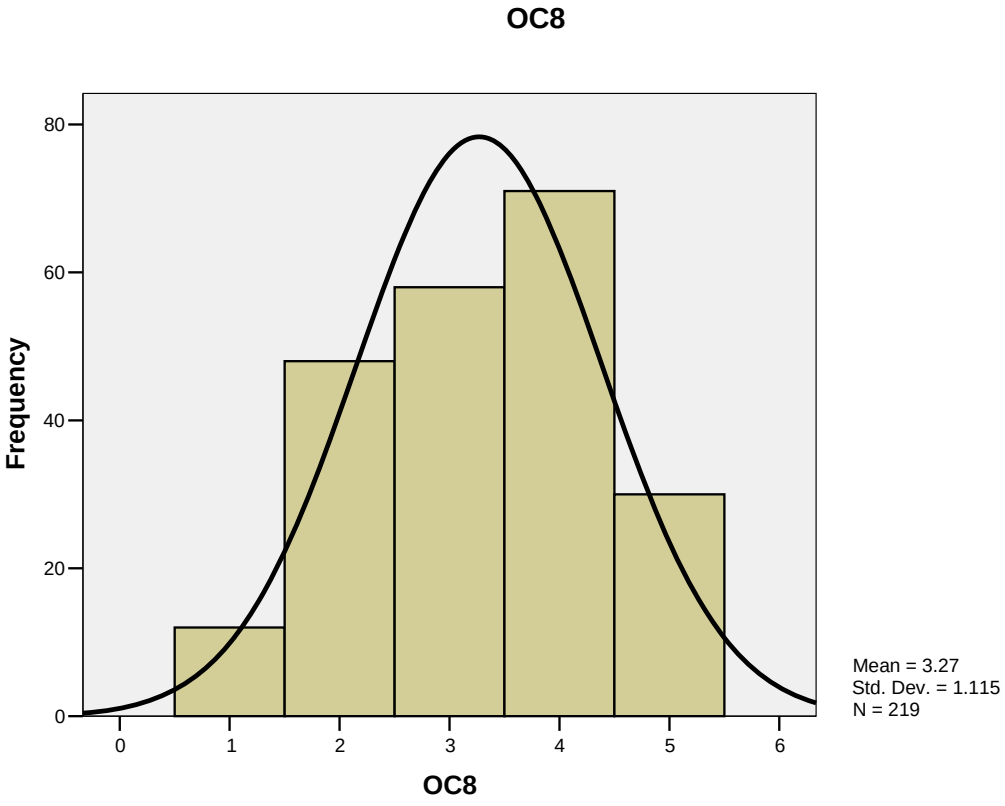

OC3
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
OC3
Mean = 3.61
Std. Dev. = 0.924
N = 219

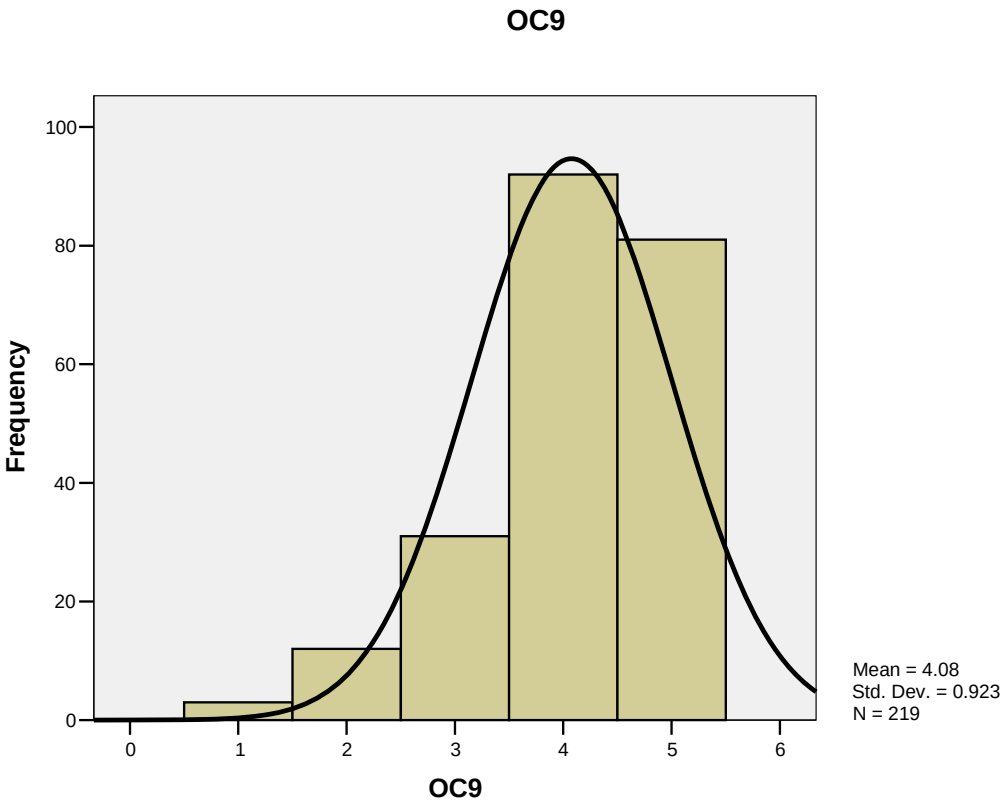

OC4
Frequency
100
80
60
40
20
0
1
2
3
4
5
6
OC4
Mean = 3.85
Std. Dev. = 0.887
N = 219

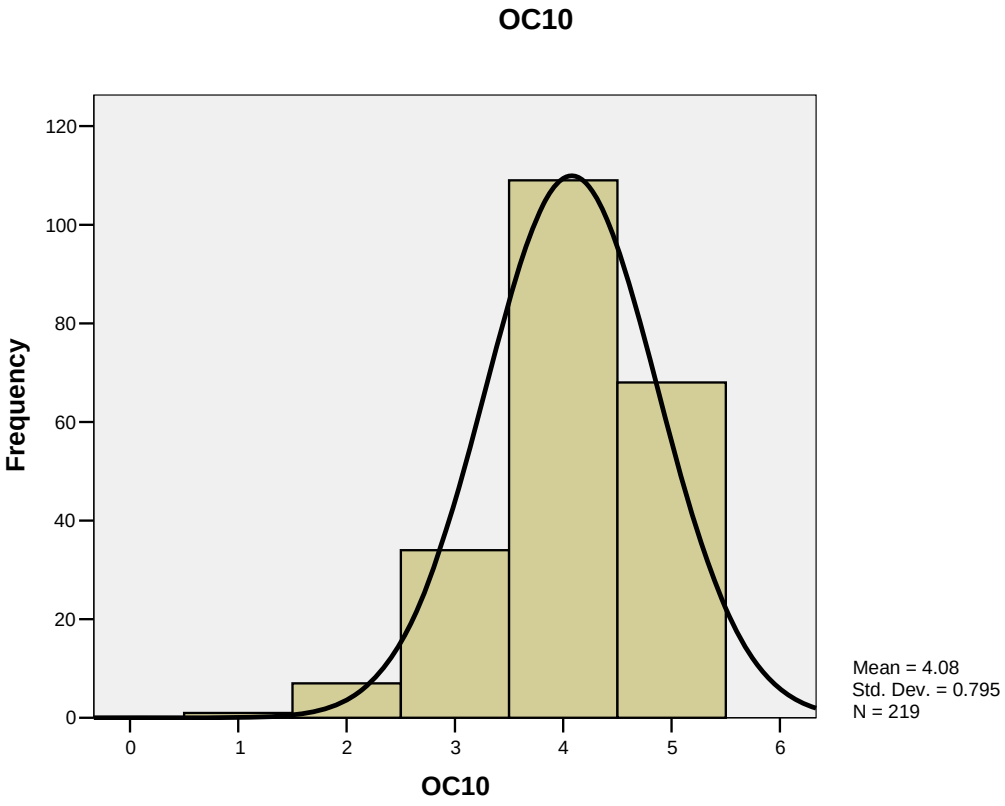

OC5
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
OC5
Mean = 3.75
Std. Dev. = 0.964
N = 219

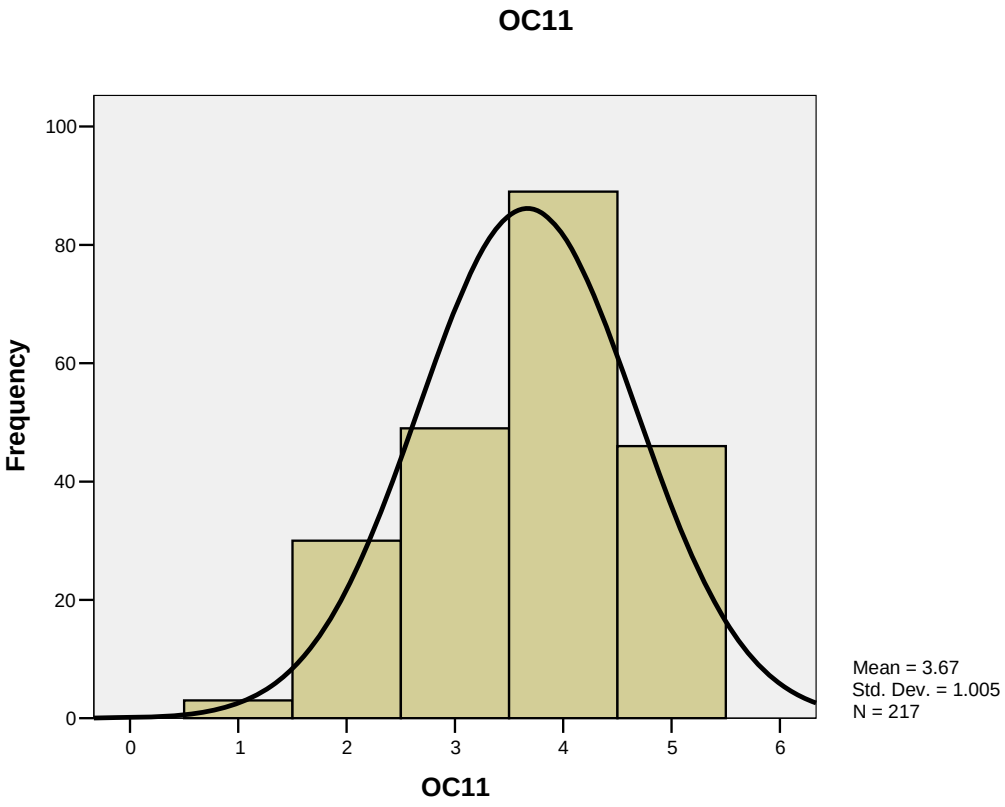

OC6
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
OC6
Mean = 3.89
Std. Dev. = 0.931
N = 218

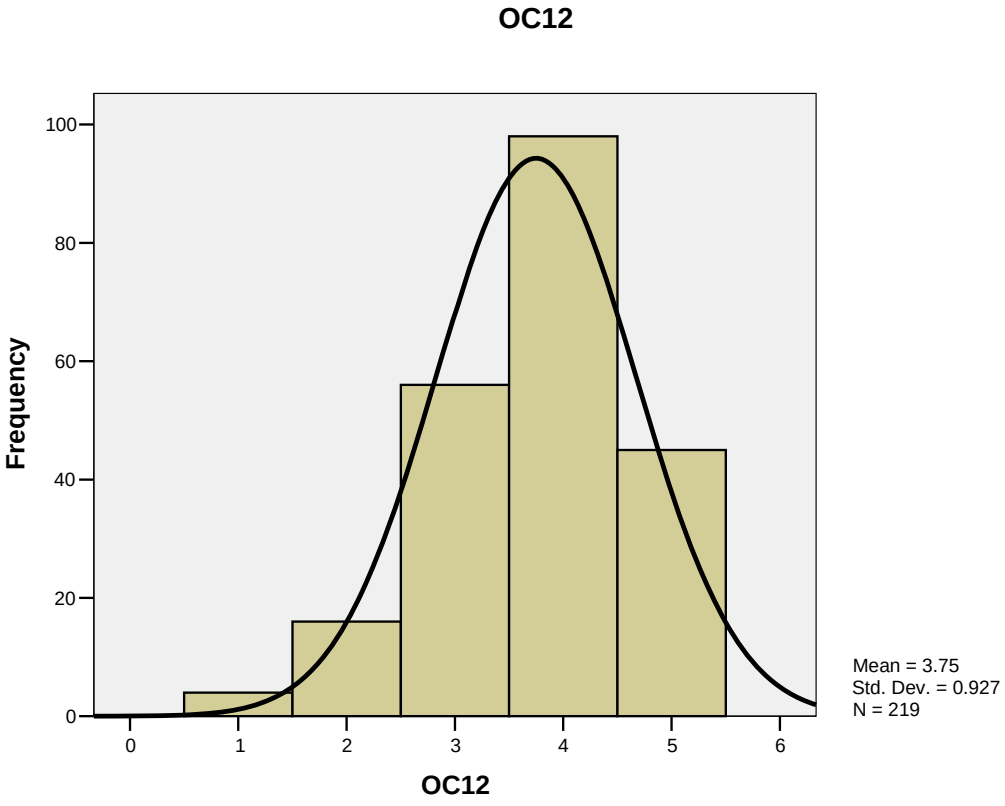

OC7
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
OC7
Mean = 3.9
Std. Dev. = 0.99
N = 219

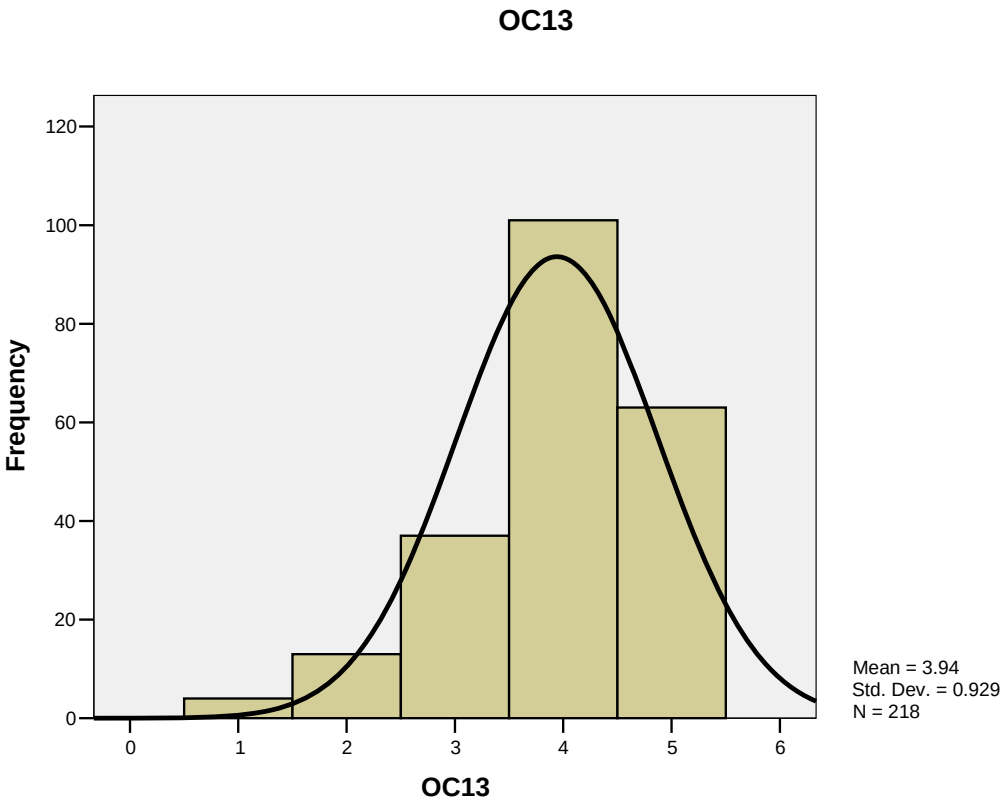

OC8
Frequency
80
60
40
20
0
0
1
2
3
4
5
6
OC8
Mean = 3.27
Std. Dev. = 1.115
N = 219

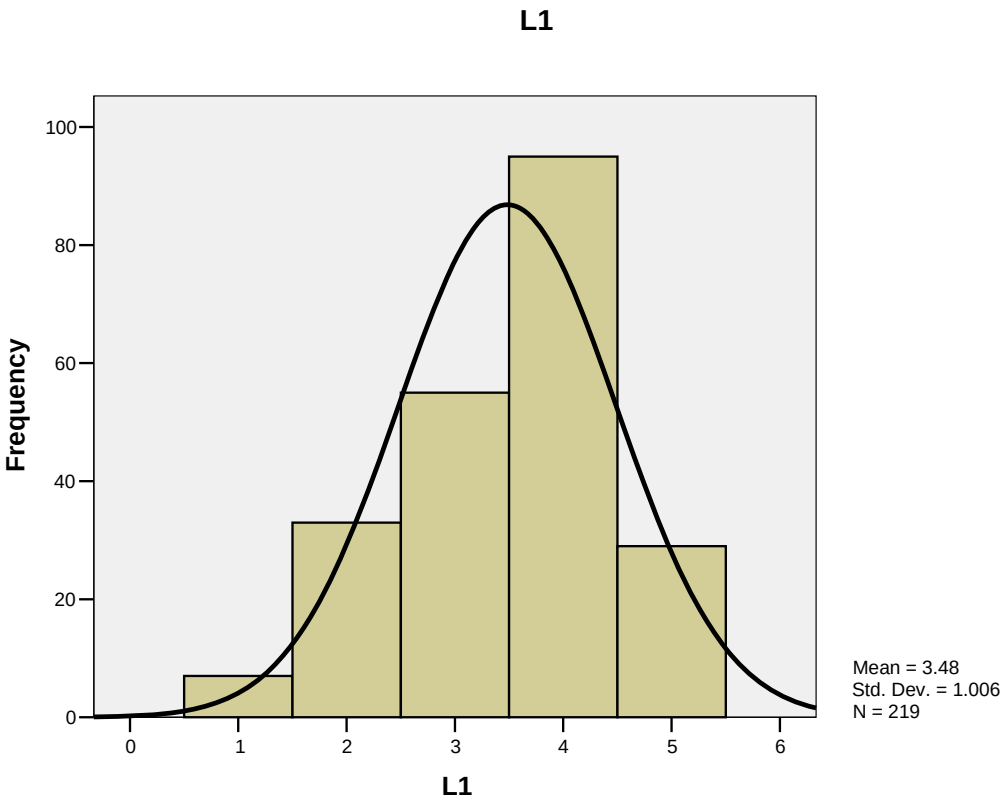

OC9
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
OC9
Mean = 4.08
Std. Dev. = 0.923
N = 219


OC10
Frequency
120
100
80
60
40
20
0
0
1
2
3
4
5
6
OC10
Mean = 4.08
Std. Dev. = 0.795
N = 219

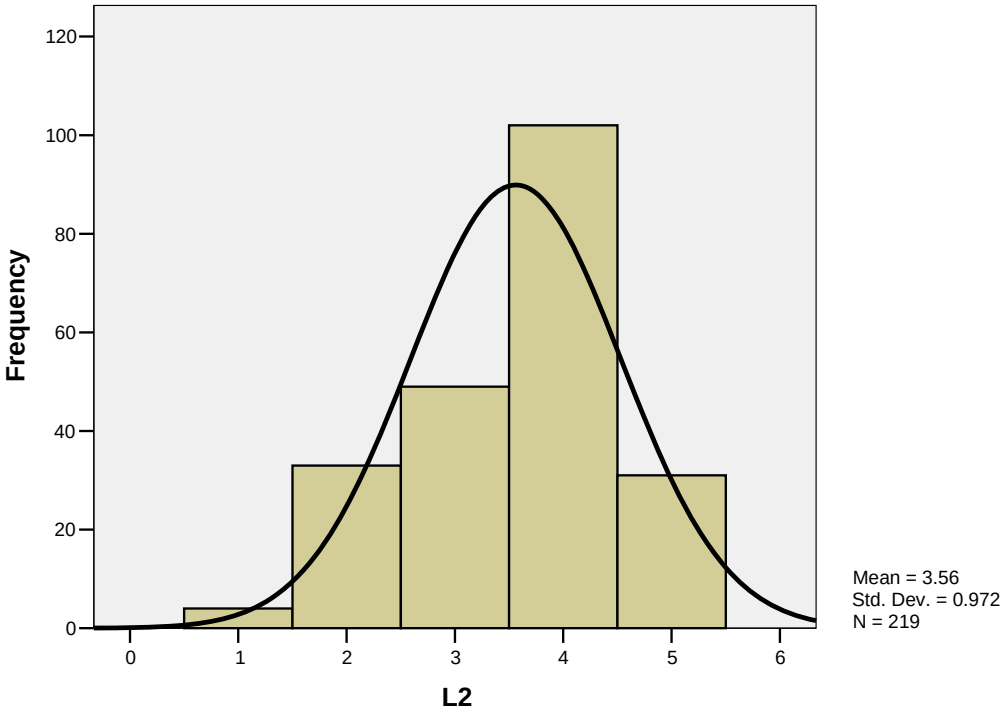

OC11
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
OC11
Mean = 3.67
Std. Dev. = 1.005
N = 217


OC12
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
OC12
Mean = 3.75
Std. Dev. = 0.927
N = 219

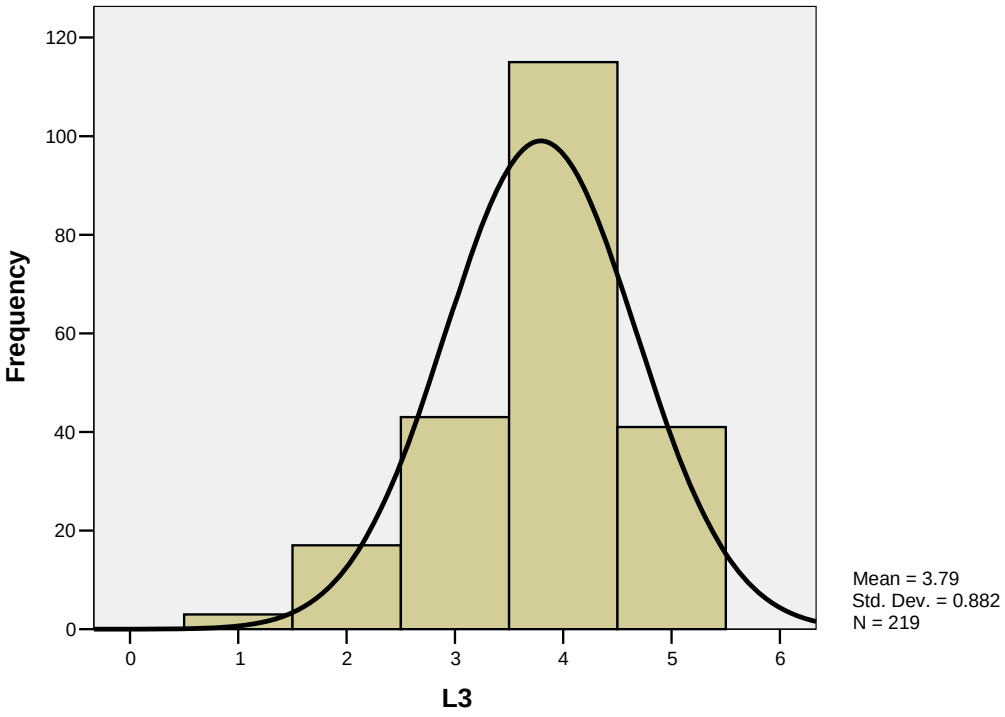

OC13
Frequency
120
100
80
60
40
20
0
0
1
2
3
4
5
6
OC13
Mean = 3.94
Std. Dev. = 0.929
N = 218


L1
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
L1
Mean = 3.48
Std. Dev. = 1.006
N = 219

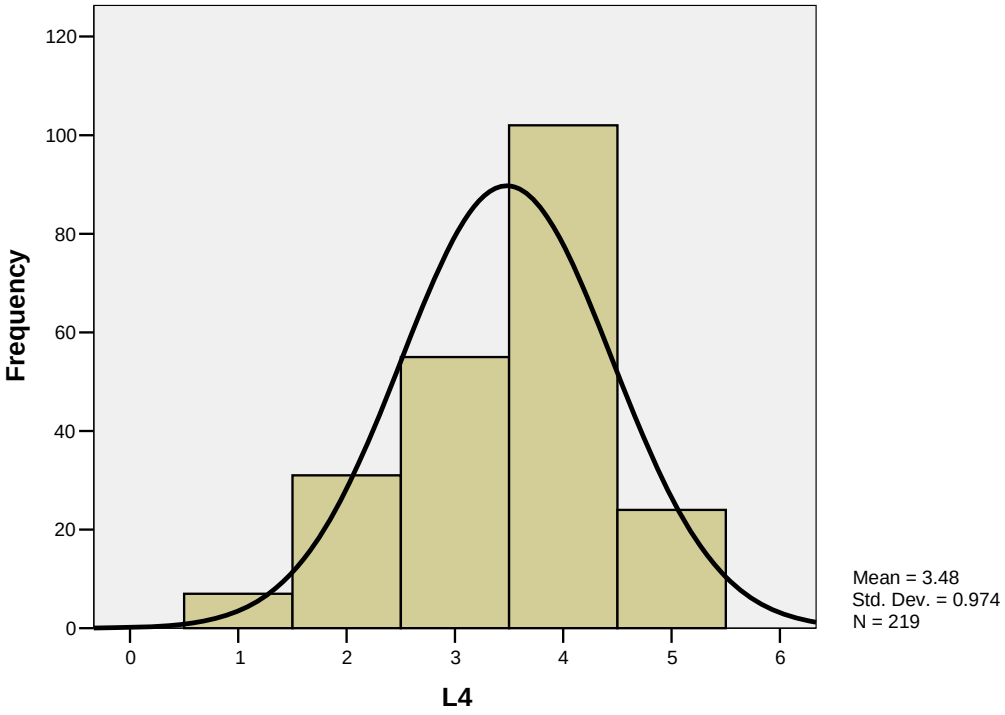
L2


Frequency
120
100
80
60
40
20
0
0
1
2
3
4
5
6
L2
Mean = 3.56
Std. Dev. = 0.972
N = 219

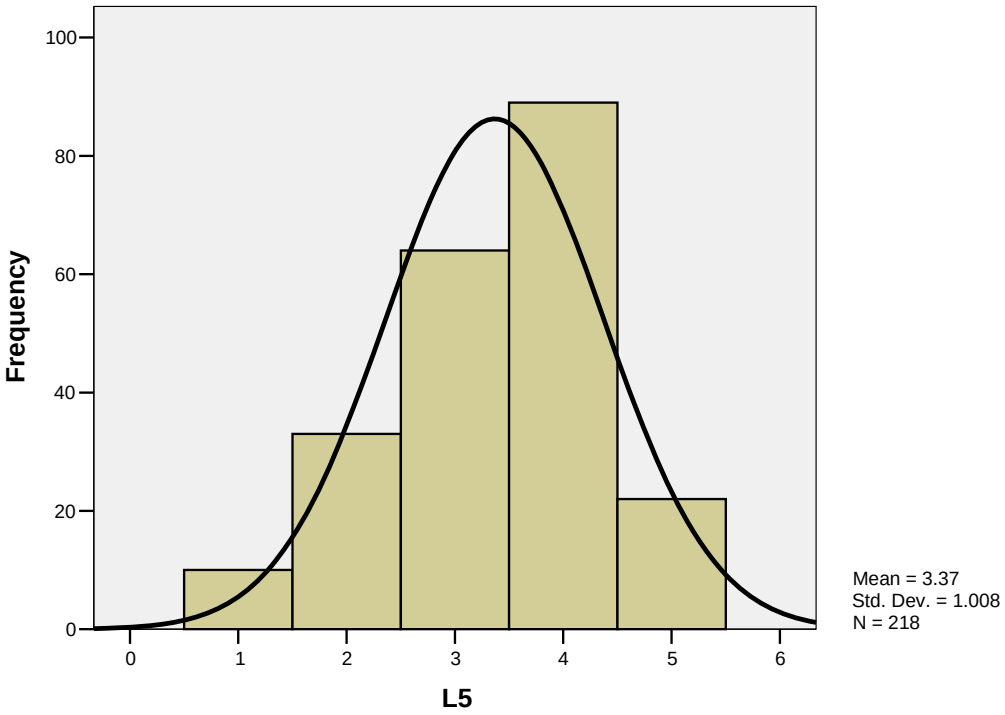
L3


Frequency
120
100
80
60
40
20
0
0
1
2
3
4
5
6
L3
Mean = 3.79
Std. Dev. = 0.882
N = 219

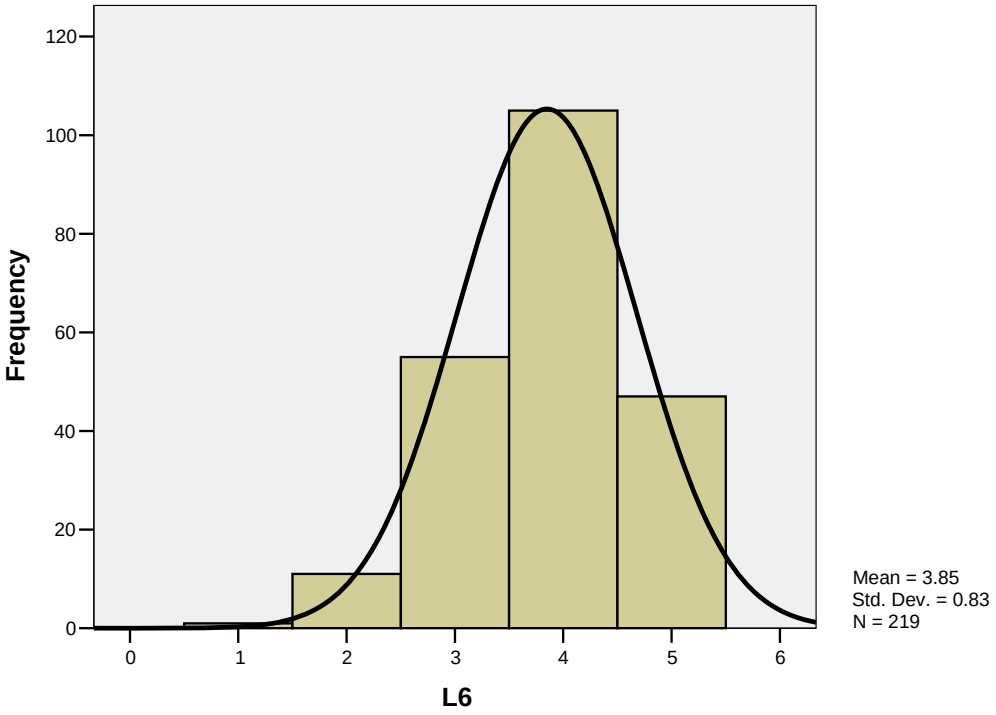
L4


Frequency
120
100
80
60
40
20
0
0
1
2
3
4
5
6
L4
Mean = 3.48
Std. Dev. = 0.974
N = 219

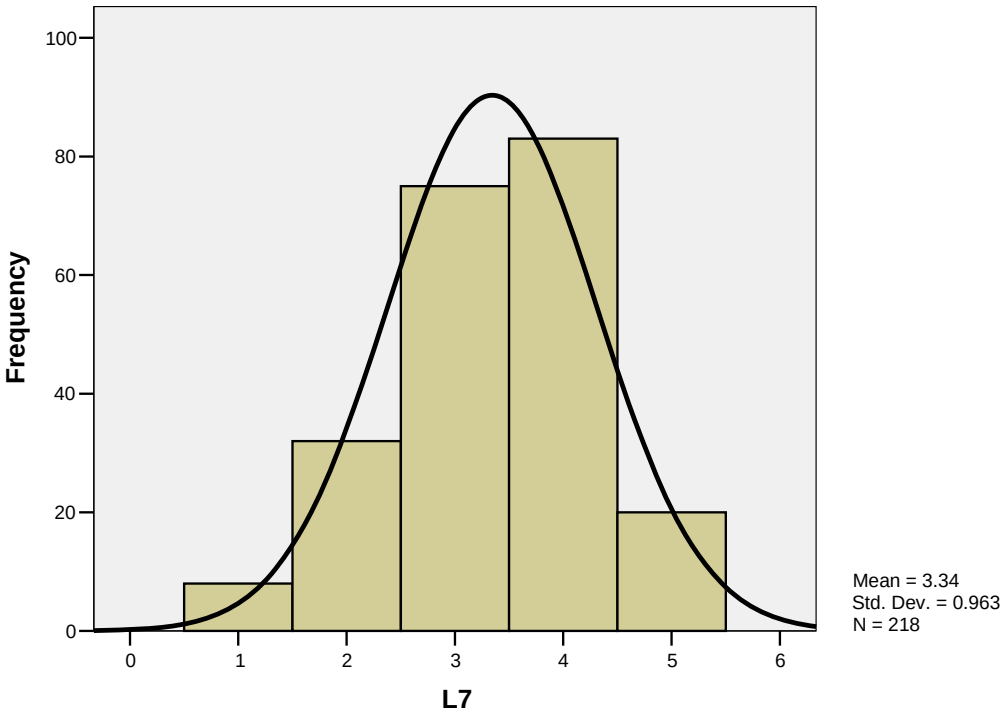
L5


Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
L5
Mean = 3.37
Std. Dev. = 1.008
N = 218

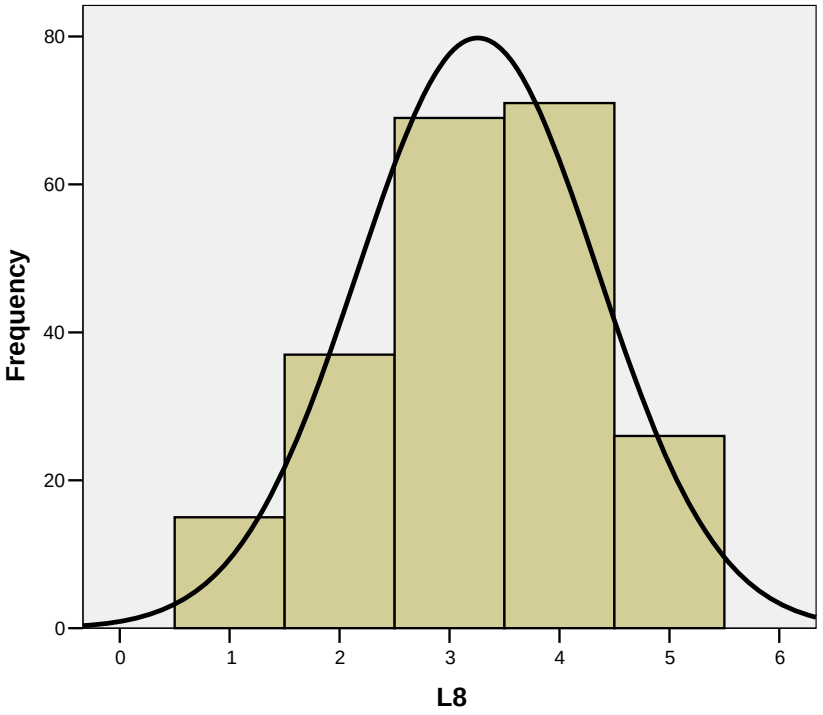
L6


Frequency
120
100
80
60
40
20
0
0
1
2
3
4
5
6
L6
Mean = 3.85
Std. Dev. = 0.83
N = 219

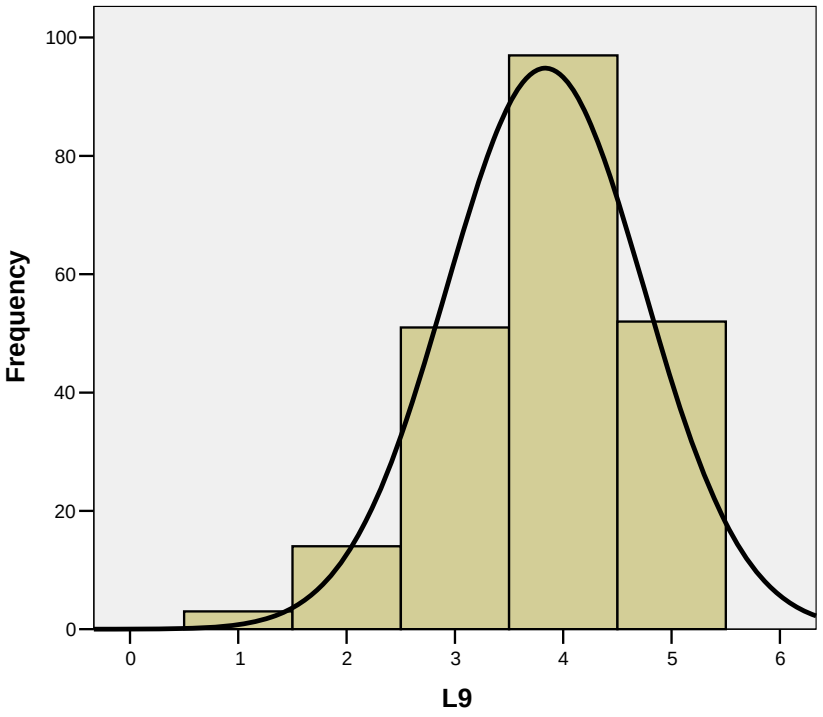
L7


Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
L7
Mean = 3.34
Std. Dev. = 0.963
N = 218

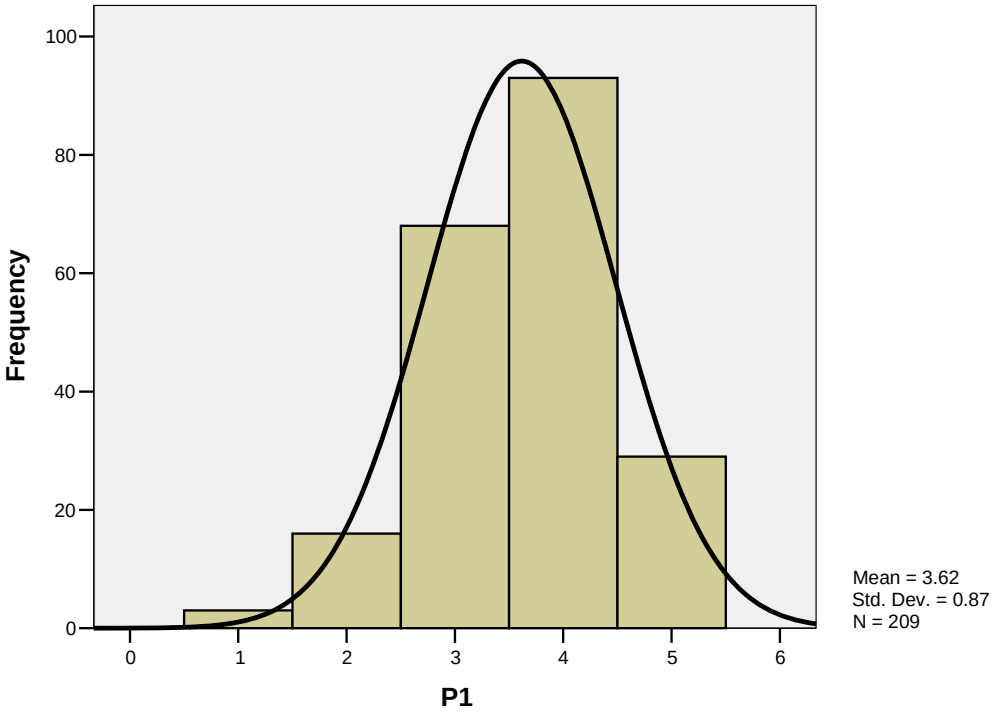
L8


Frequency
80
60
40
20
0
0
1
2
3
4
5
6
L8
Mean = 3.26
Std. Dev. = 1.09
N = 218

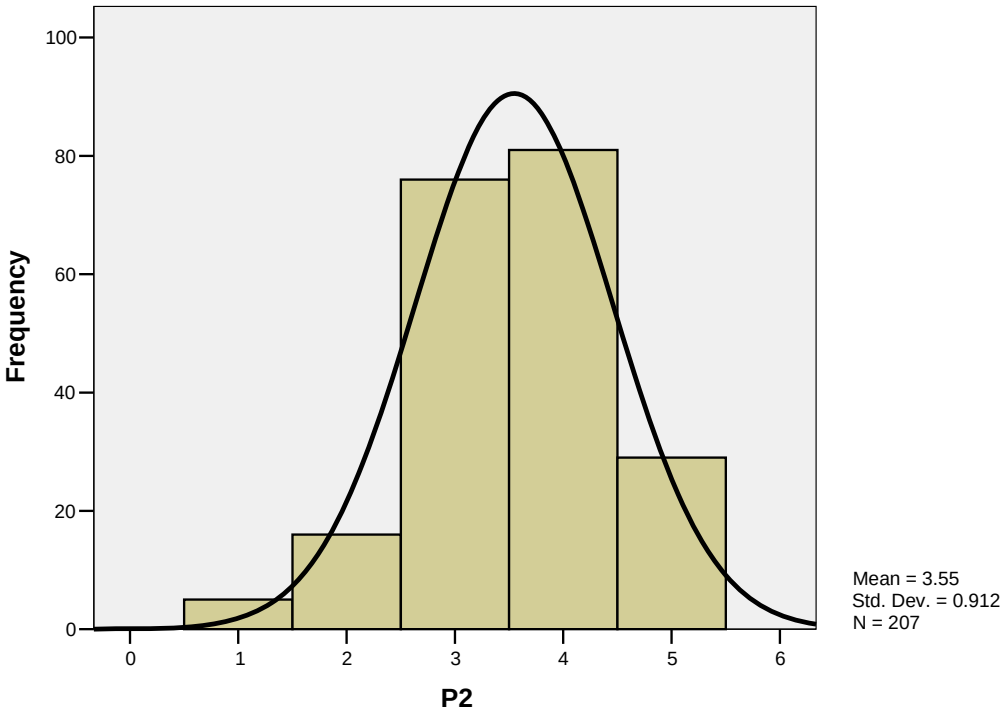
L9

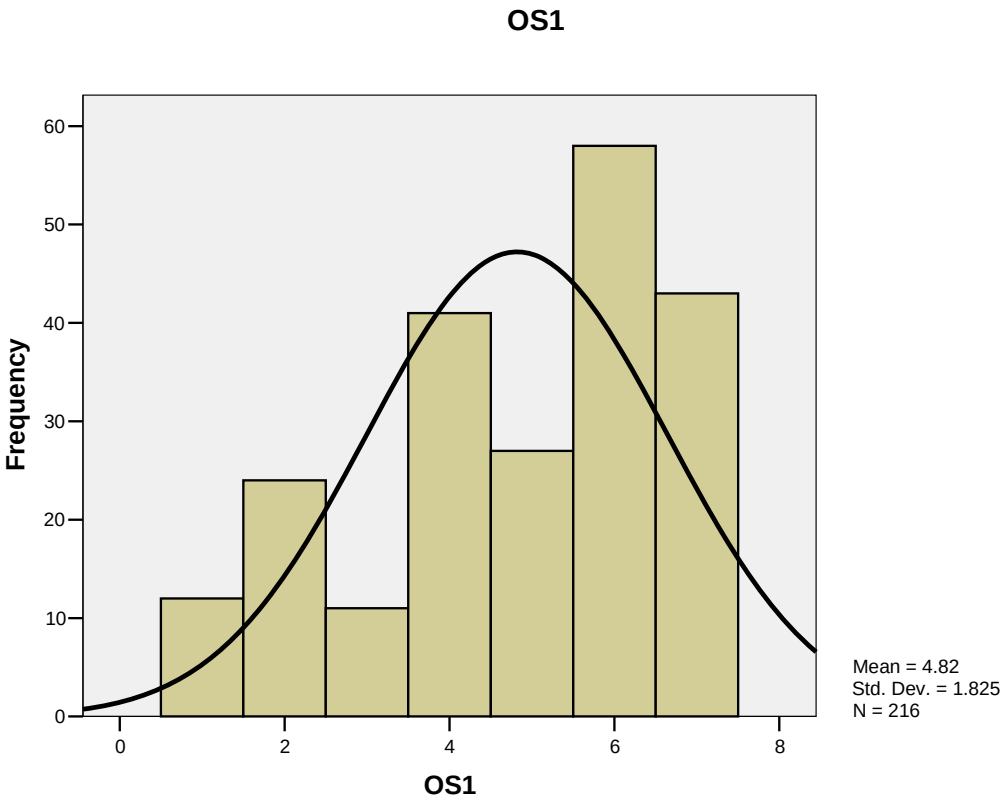

Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
L9
Mean = 3.83
Std. Dev. = 0.913
N = 217

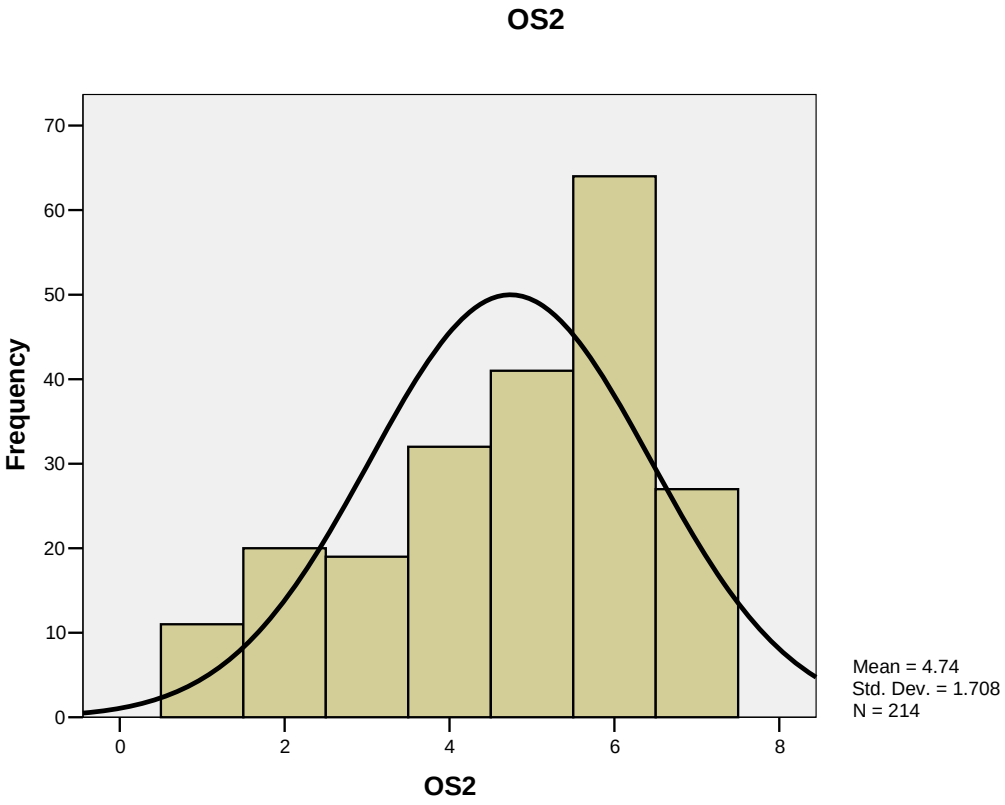
P1

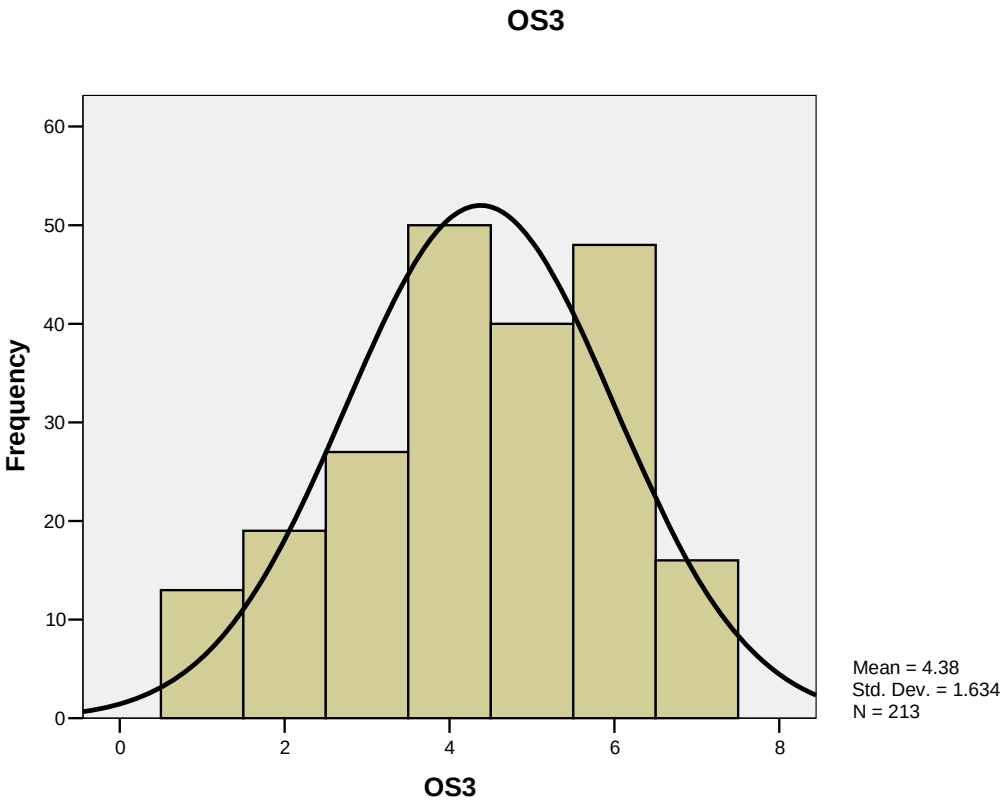

Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
P1
Mean = 3.62
Std. Dev. = 0.87
N = 209

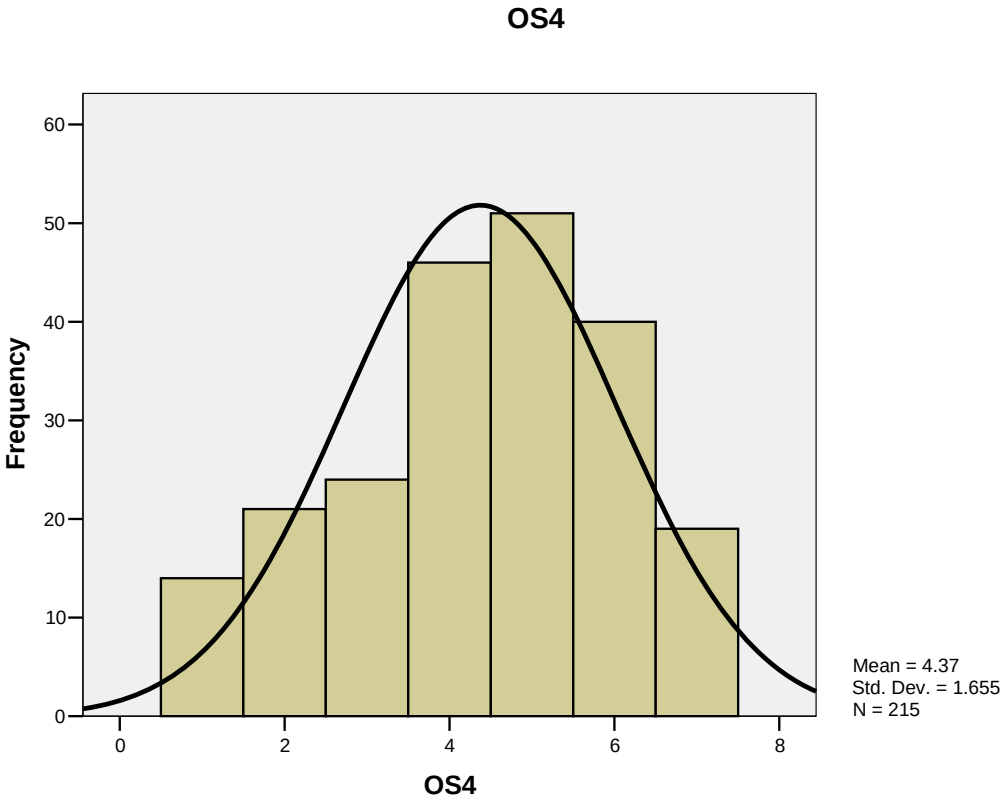
P2

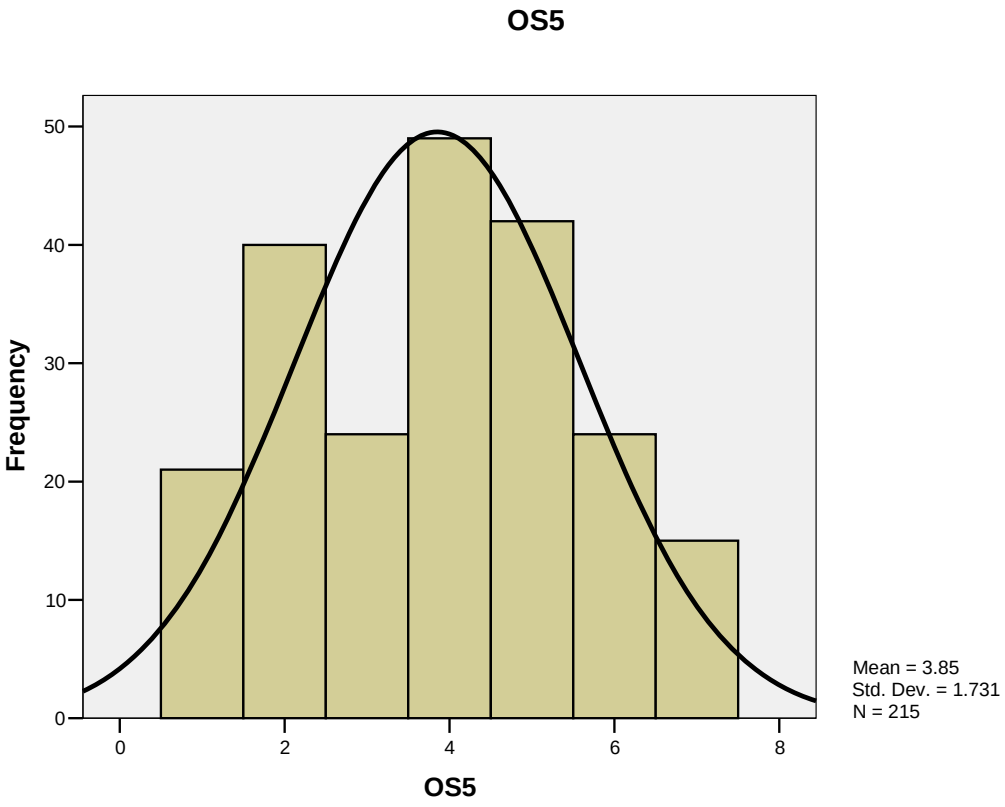

Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
P2
Mean = 3.55
Std. Dev. = 0.912
N = 207

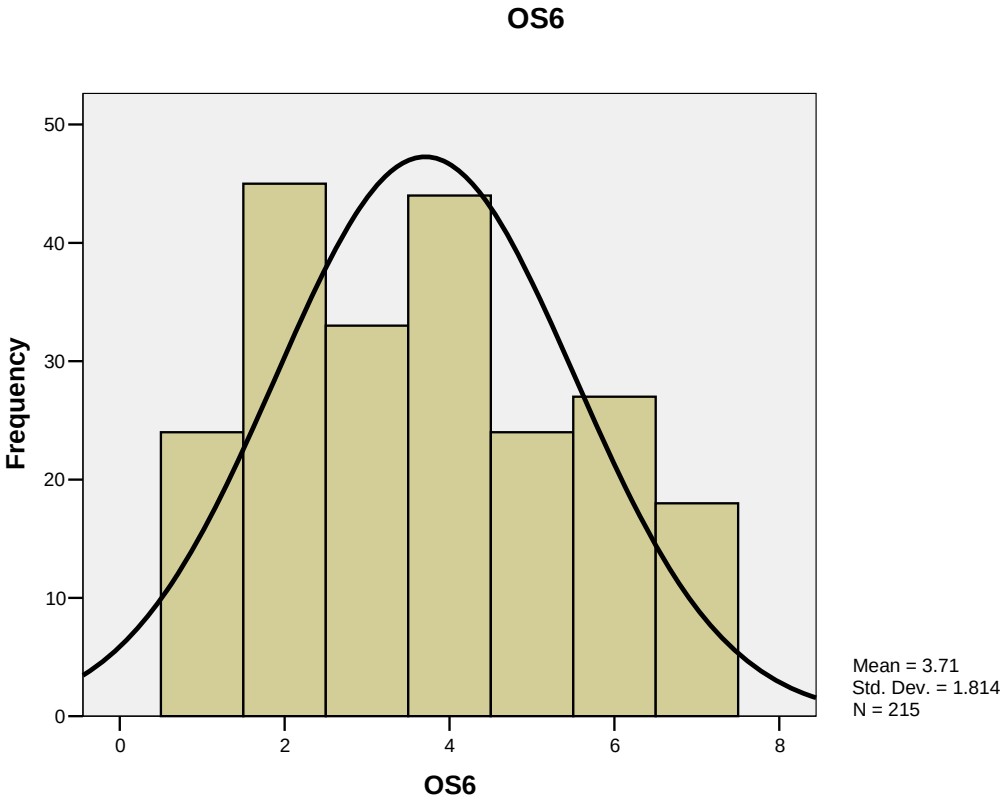

OS1
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
OS1
Mean = 4.82
Std. Dev. = 1.825
N = 216

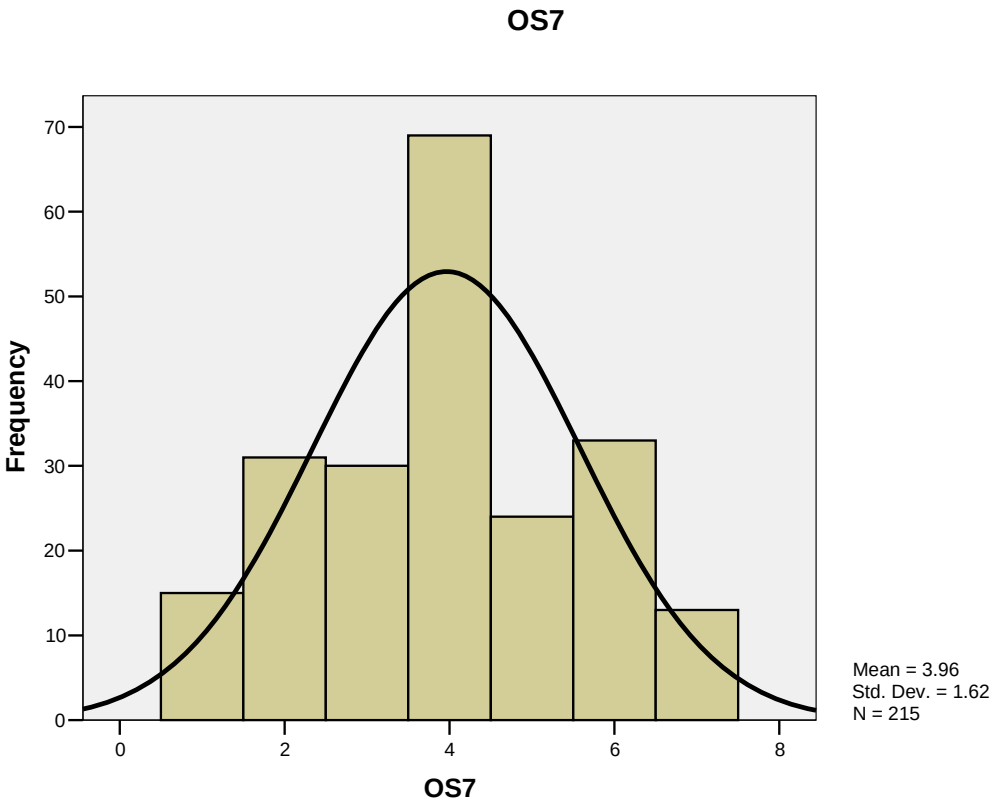

OS2
Frequency
70
60
50
40
30
20
10
0
0
2
4
6
8
OS2
Mean = 4.74
Std. Dev. = 1.708
N = 214

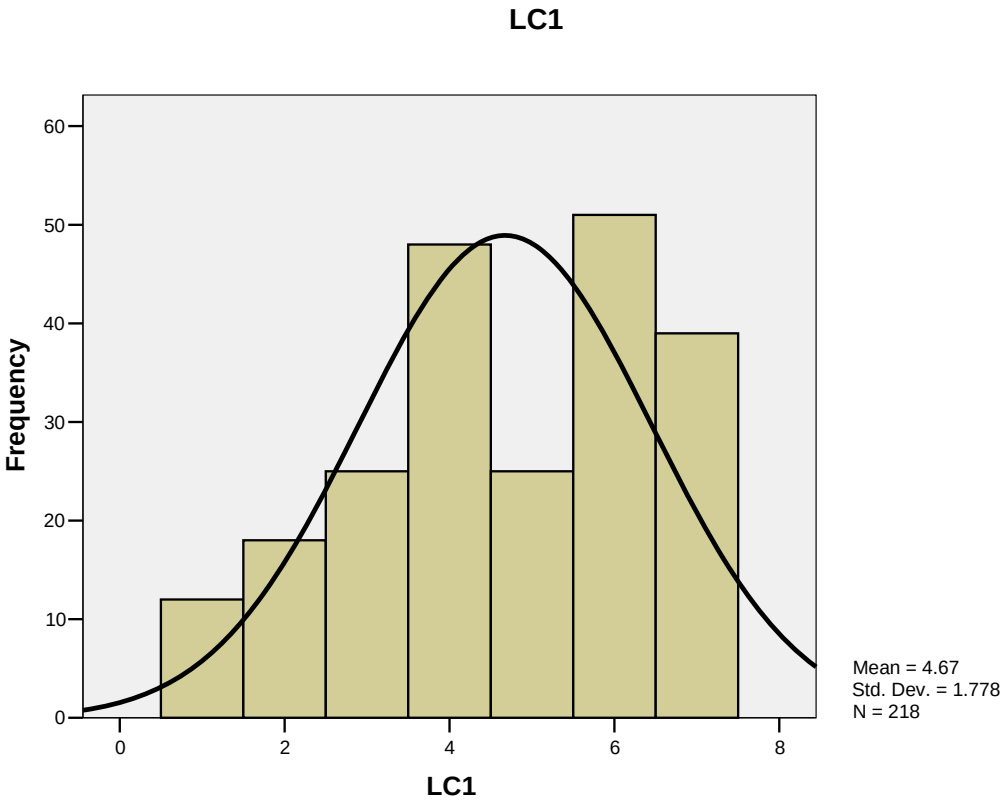

OS3
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
OS3
Mean = 4.38
Std. Dev. = 1.634
N = 213

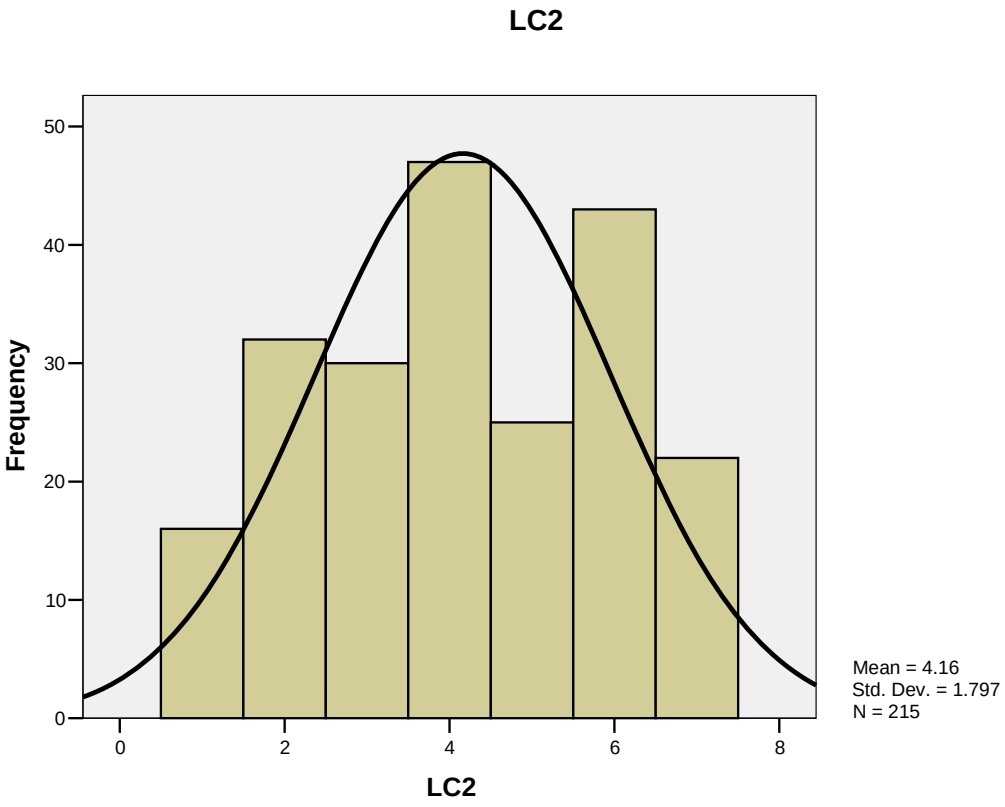

OS4
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
OS4
Mean = 4.37
Std. Dev. = 1.655
N = 215

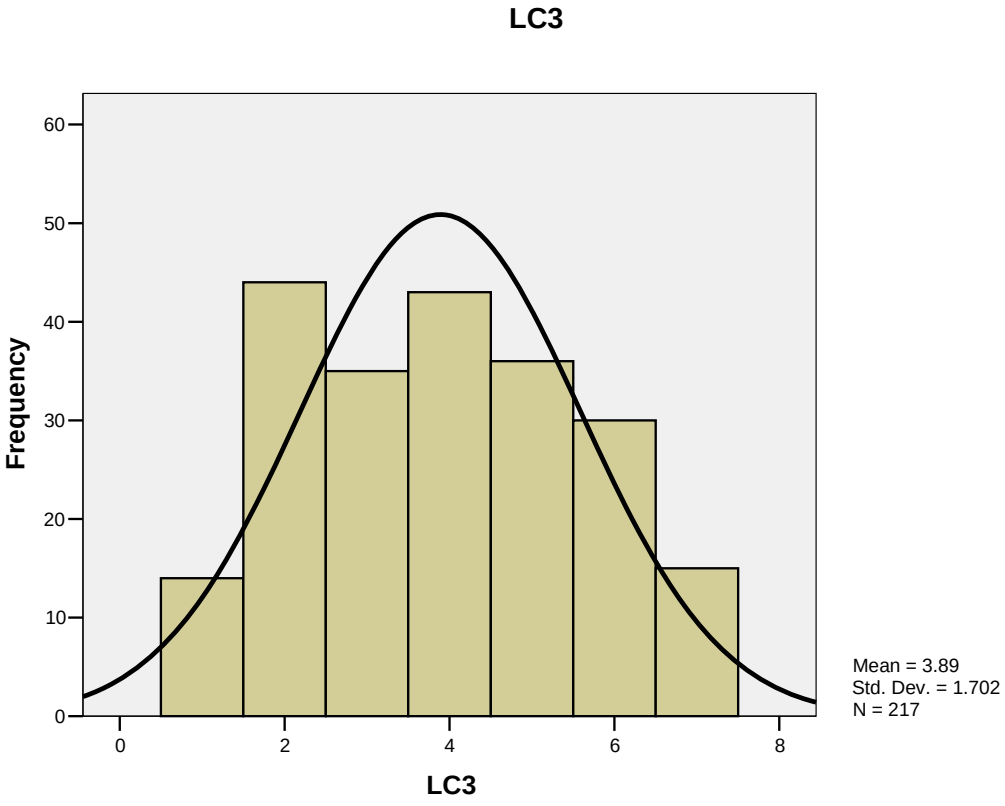

OS5
Frequency
50
40
30
20
10
0
0
2
4
6
8
OS5
Mean = 3.85
Std. Dev. = 1.731
N = 215

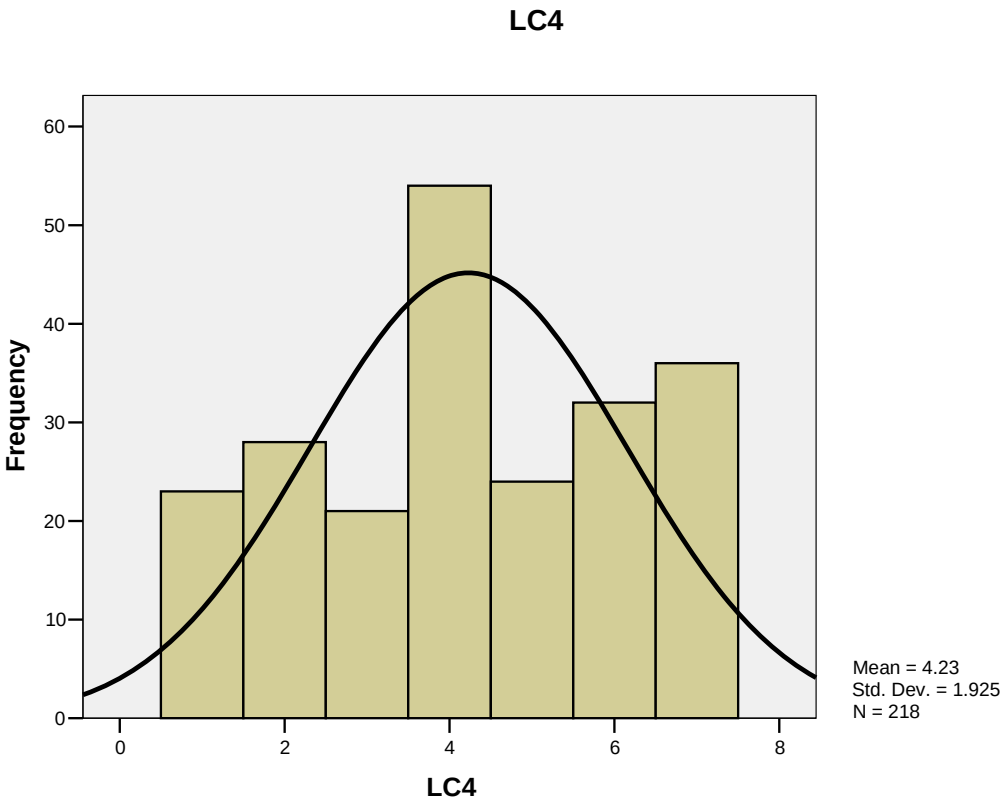

OS6
Frequency
50
40
30
20
10
0
0
2
4
6
8
OS6
Mean = 3.71
Std. Dev. = 1.814
N = 215

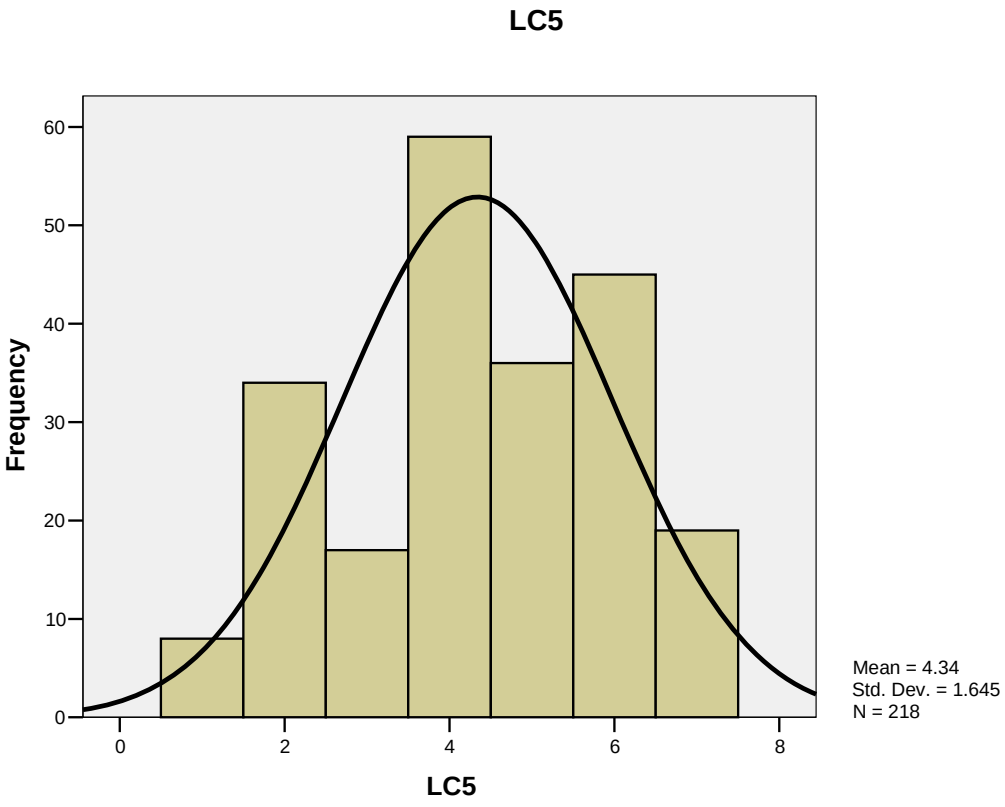

OS7
Frequency
70
60
50
40
30
20
10
0
0
2
4
6
8
OS7
Mean = 3.96
Std. Dev. = 1.62
N = 215

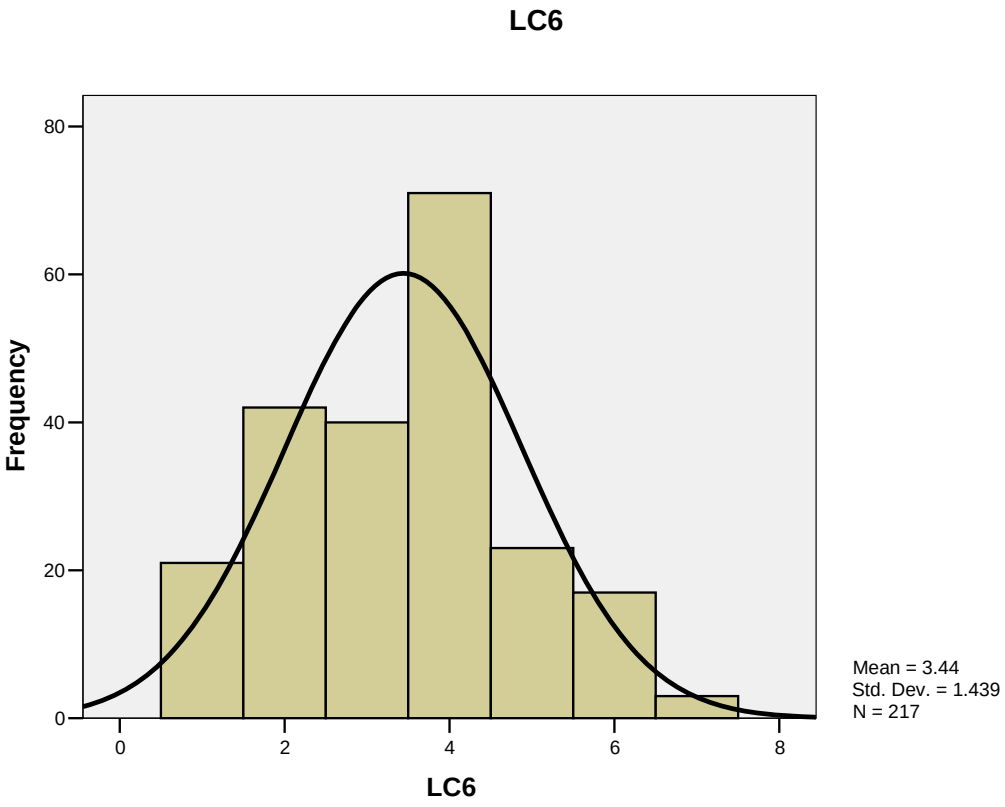

LC1
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
LC1
Mean = 4.67
Std. Dev. = 1.778
N = 218

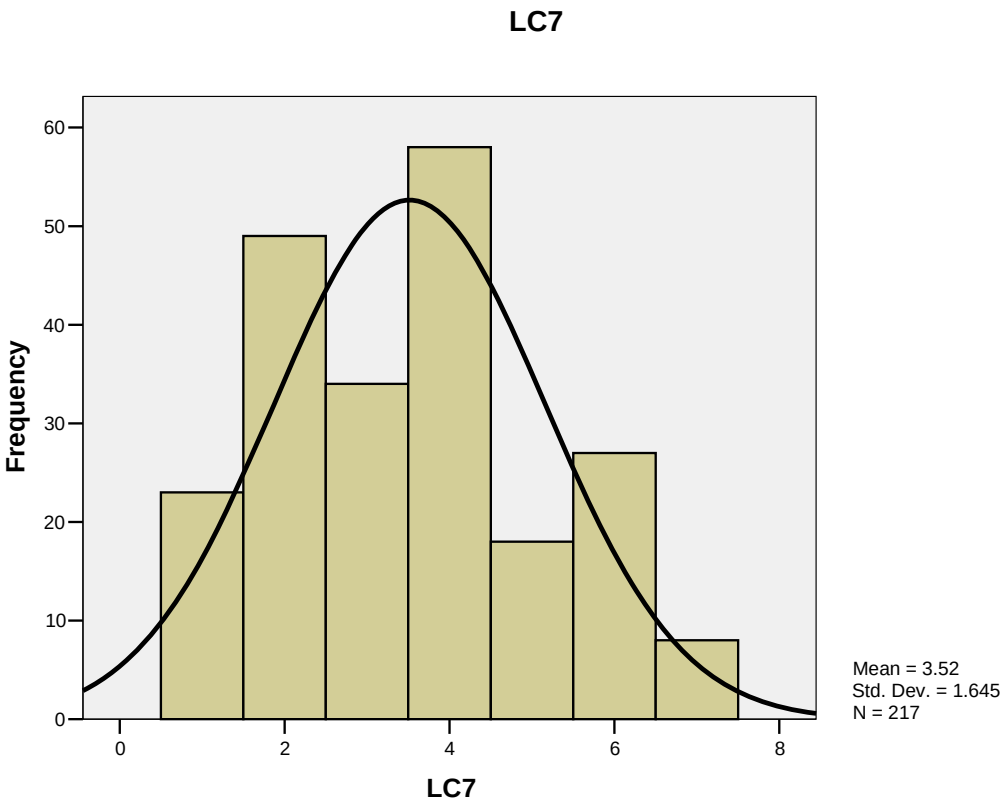

LC2
Frequency
50
40
30
20
10
0
0
2
4
6
8
LC2
Mean = 4.16
Std. Dev. = 1.797
N = 215

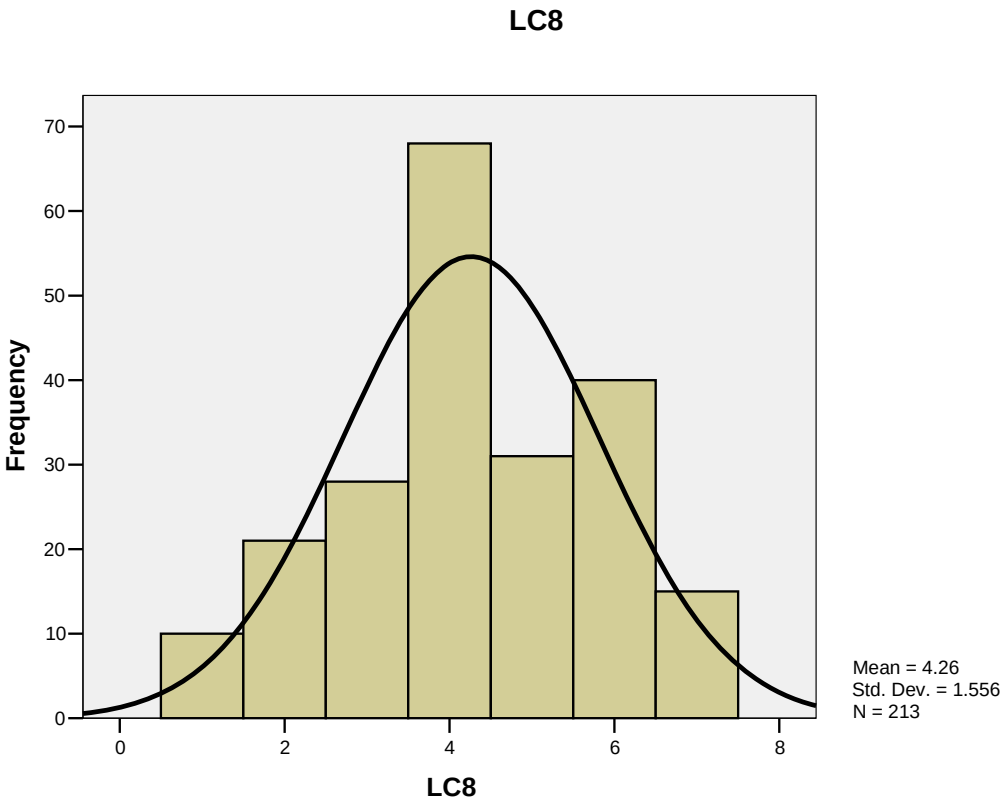

LC3
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
LC3
Mean = 3.89
Std. Dev. = 1.702
N = 217

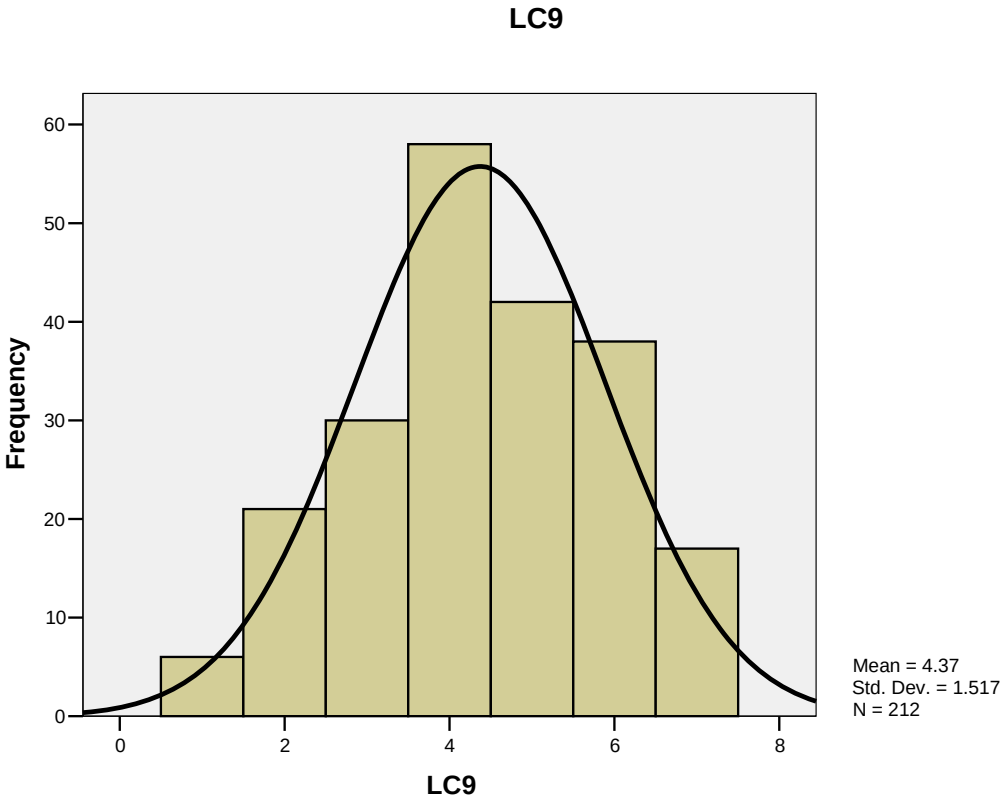

LC4
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
LC4
Mean = 4.23
Std. Dev. = 1.925
N = 218


LC5
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
LC5
Mean = 4.34
Std. Dev. = 1.645
N = 218


LC6
Frequency
80
60
40
20
0
0
2
4
6
8
LC6
Mean = 3.44
Std. Dev. = 1.439
N = 217


LC7
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
LC7
Mean = 3.52
Std. Dev. = 1.645
N = 217


LC8
Frequency
70
60
50
40
30
20
10
0
0
2
4
6
8
LC8
Mean = 4.26
Std. Dev. = 1.556
N = 213


LC9
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
LC9
Mean = 4.37
Std. Dev. = 1.517
N = 212

Appendix D2: Descriptive statistics for nominal variables

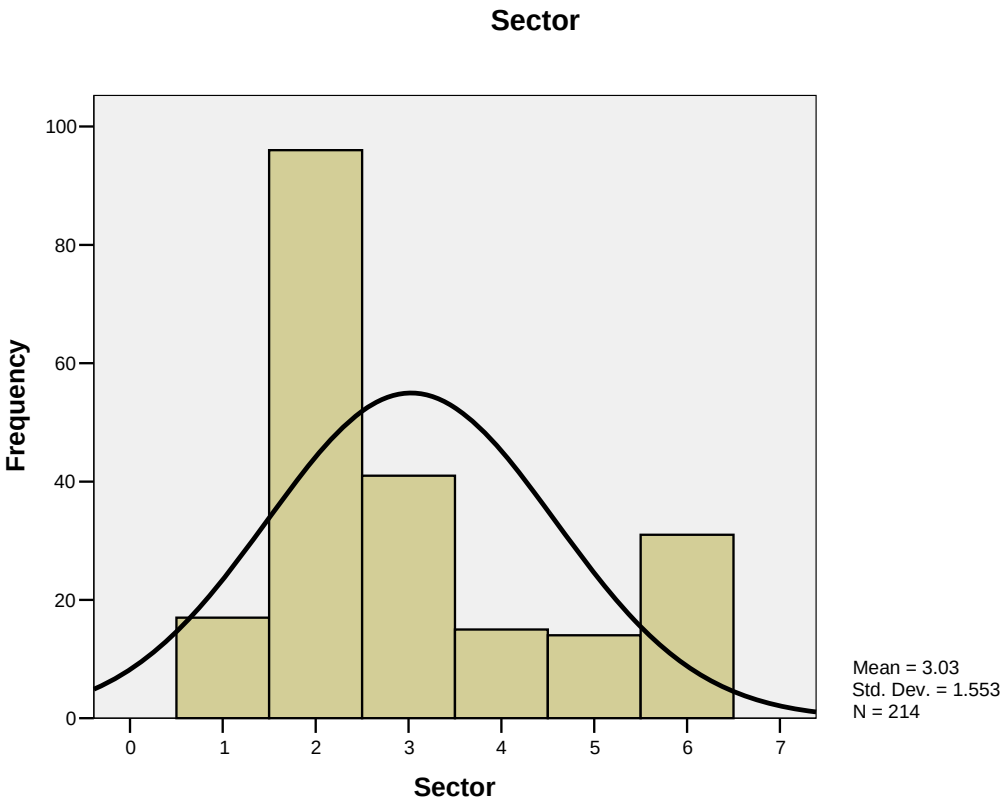
	N		Mean	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
	Valid	Missing						
Sector	214	5	3.03	1.553	.871	-.522	1	6
Major equity ownership	219	0	1.16	.367	1.870	1.509	1	2
Valid N (listwise)	214							

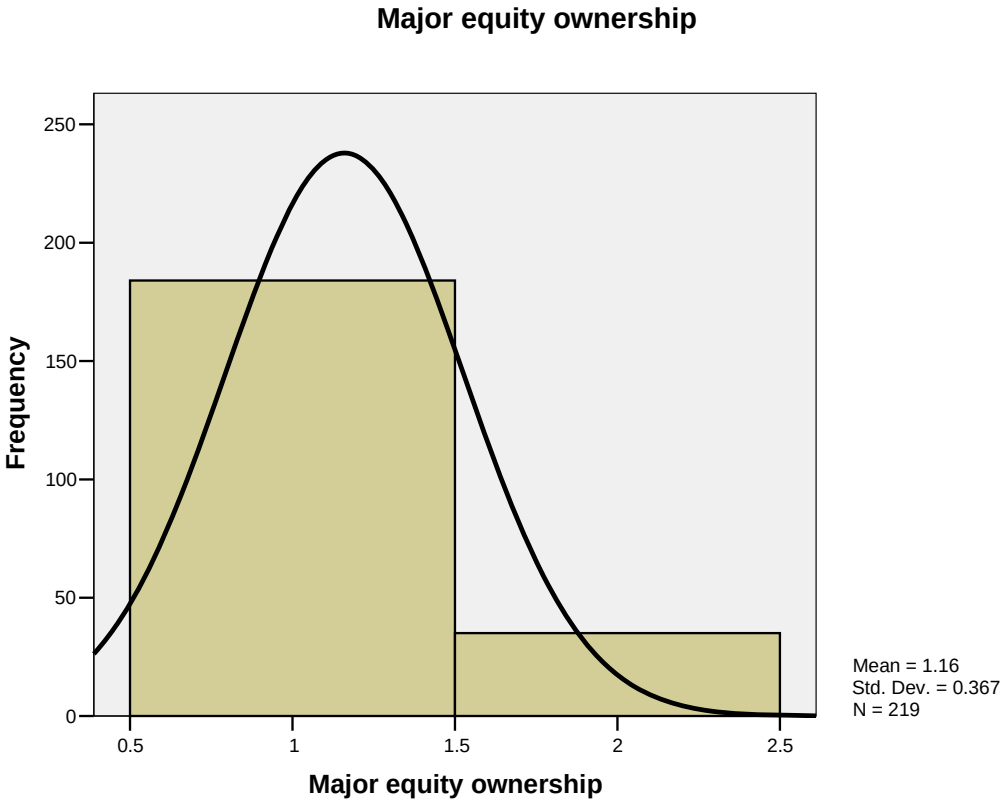
Sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Creative multimedia	17	7.8	7.9	7.9
	Software development	96	43.8	44.9	52.8
	Support services	41	18.7	19.2	72.0
	Hardware design	15	6.8	7.0	79.0
	Internet based business	14	6.4	6.5	85.5
	Shared services & outsourcing	31	14.2	14.5	100.0
	Total	214	97.7	100.0	
Missing	System	5	2.3		
Total		219	100.0		

Major equity ownership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Local	184	84.0	84.0	84.0
	Foreign	35	16.0	16.0	100.0
	Total	219	100.0	100.0	


Sector
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
7
Sector
Mean = 3.03
Std. Dev. = 1.553
N = 214


Major equity ownership
Frequency
250
200
150
100
50
0
0.5
1
1.5
2
2.5
Major equity ownership
Mean = 1.16
Std. Dev. = 0.367
N = 219

Appendix D3: Descriptive statistics for ordinal variables

	N		Mean	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
	Valid	Missing						
Current operational status	216	3	3.51	1.347	.753	-.532	1	6
Annual revenue	217	2	2.68	1.496	.867	-.150	1	6
Number of employees	217	2	2.94	1.665	.583	-.828	1	6
Valid N (listwise)	214							

Current operational status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Seed	3	1.4	1.4	1.4
	Start-up	39	17.8	18.1	19.4
	Growth	105	47.9	48.6	68.1
	Pre initial public offering	17	7.8	7.9	75.9
	Post initial public offering	18	8.2	8.3	84.3
	Multi-national or subsidiaries thereof	34	15.5	15.7	100.0
	Total	216	98.6	100.0	
Missing	System	3	1.4		
Total		219	100.0		

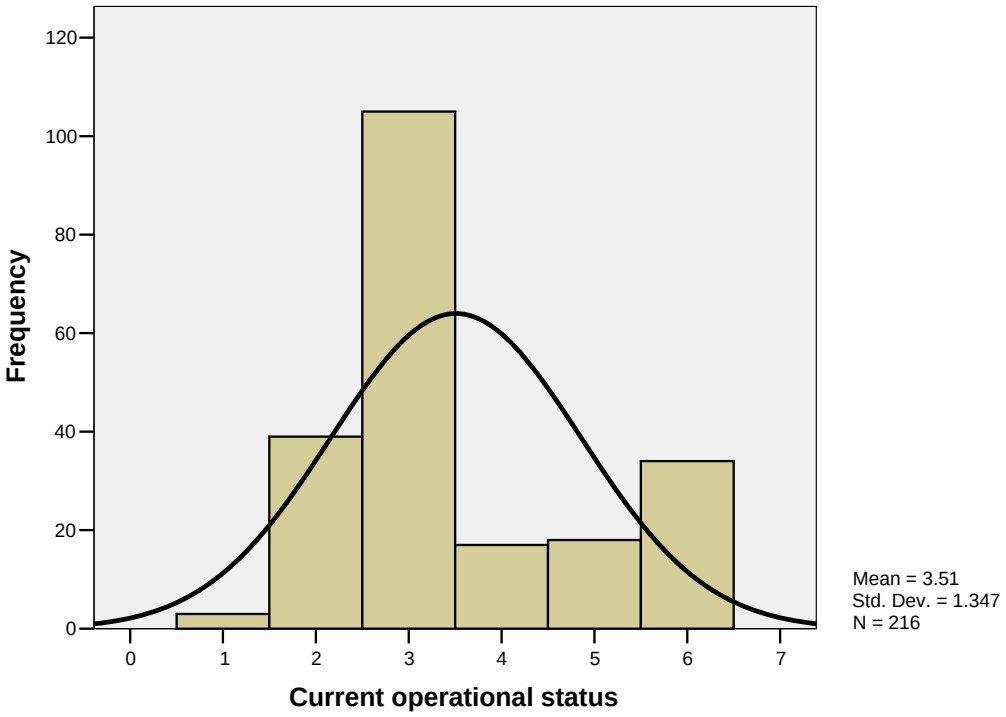
Annual revenue

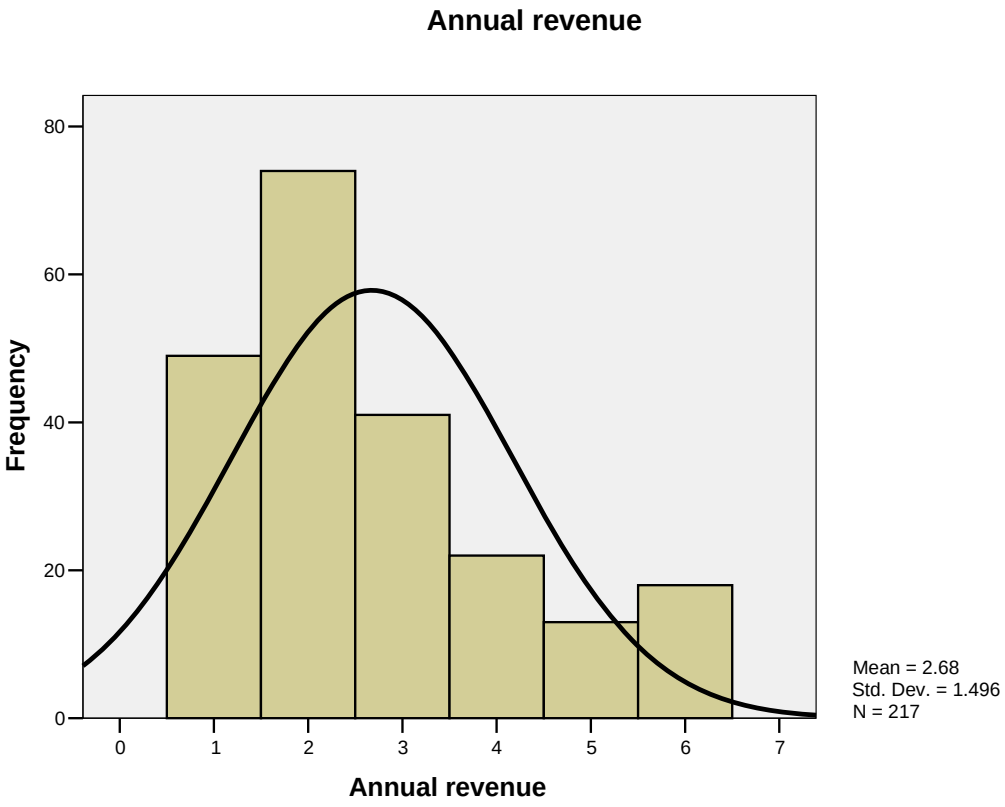
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than RM 1 million	49	22.4	22.6	22.6
	RM 1 million - RM 5 million	74	33.8	34.1	56.7
	RM 5 million - RM 10 million	41	18.7	18.9	75.6
	RM 10 million - RM 20 million	22	10.0	10.1	85.7
	RM 20 million - RM 50 million	13	5.9	6.0	91.7
	More than RM 50 million	18	8.2	8.3	100.0
	Total	217	99.1	100.0	
Missing	System	2	.9		
Total		219	100.0		

Number of employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 10	51	23.3	23.5	23.5
	10 - 20	52	23.7	24.0	47.5
	20 - 50	48	21.9	22.1	69.6
	50 - 100	20	9.1	9.2	78.8
	100 - 200	18	8.2	8.3	87.1
	More than 200	28	12.8	12.9	100.0
	Total	217	99.1	100.0	
Missing	System	2	.9		
Total		219	100.0		

Current operational status




Annual revenue
Frequency
80
60
40
20
0
0
1
2
3
4
5
6
7
Annual revenue
Mean = 2.68
Std. Dev. = 1.496
N = 217


Number of employees
Frequency
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
Number of employees
Mean = 2.94
Std. Dev. = 1.665
N = 217

Appendix D4: Cronbach's alpha for organizational culture

Case Processing Summary

		N	%
Cases	Valid	216	98.6
	Excluded[a]	3	1.4
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.840	.842	13

Item Statistics

	Mean	Std. Deviation	N
OC1	3.60	.992	216
OC2	3.60	.944	216
OC3	3.61	.928	216
OC4	3.87	.887	216
OC5	3.76	.967	216
OC6	3.89	.933	216
OC7	3.90	.991	216
OC8	3.28	1.119	216
OC9	4.08	.926	216
OC10	4.08	.797	216
OC11	3.67	1.006	216
OC12	3.76	.924	216
OC13	3.94	.933	216

Inter-Item Correlation Matrix

	OC1	OC2	OC3	OC4	OC5	OC6	OC7	OC8	OC9	OC10	OC11	OC12	OC13
OC1	1.00	.569	.235	.362	.459	.424	.320	.247	.294	.401	.208	.245	.232
OC2	.569	1.00	.300	.369	.477	.472	.391	.387	.453	.366	.214	.183	.217
OC3	.235	.300	1.00	.303	.239	.218	.151	.216	.254	.233	.271	-.023	.072
OC4	.362	.369	.303	1.00	.381	.347	.366	.230	.348	.378	.263	.159	.137
OC5	.459	.477	.239	.381	1.00	.517	.360	.289	.370	.358	.188	.139	.192
OC6	.424	.472	.218	.347	.517	1.00	.401	.324	.489	.369	.179	.131	.265
OC7	.320	.391	.151	.366	.360	.401	1.00	.314	.379	.429	.150	.218	.271
OC8	.247	.387	.216	.230	.289	.324	.314	1.00	.363	.308	.296	.092	.175
OC9	.294	.453	.254	.348	.370	.489	.379	.363	1.00	.495	.249	.143	.301
OC10	.401	.366	.233	.378	.358	.369	.429	.308	.495	1.00	.307	.230	.388
OC11	.208	.214	.271	.263	.188	.179	.150	.296	.249	.307	1.00	.215	.169
OC12	.245	.183	-.023	.159	.139	.131	.218	.092	.143	.230	.215	1.00	.292
OC13	.232	.217	.072	.137	.192	.265	.271	.175	.301	.388	.169	.292	1.00

The covariance matrix is calculated and used in the analysis.

Summary Item Statistics

	Mean	Minimum		Range	Maximum / Minimum	Variance	N of Items
Item Means	3.774	3.278	4.083	.806	1.246	.050	13
Inter-Item Correlations	.291	-.023	.569	.592	-24.873	.013	13

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
49.06	52.527	7.248	13

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
OC1	45.45	44.091	.565	.428	.823
OC2	45.45	43.719	.634	.484	.819
OC3	45.44	47.299	.342	.192	.839
OC4	45.19	45.596	.513	.304	.828
OC5	45.29	44.338	.563	.389	.824
OC6	45.17	44.316	.591	.426	.822
OC7	45.15	44.567	.528	.326	.826
OC8	45.78	44.481	.455	.254	.832
OC9	44.97	44.409	.588	.418	.822
OC10	44.97	45.367	.608	.422	.823
OC11	45.38	46.377	.375	.208	.837
OC12	45.30	48.135	.276	.168	.843
OC13	45.11	46.899	.372	.224	.837

Appendix D5: Cronbach's alpha for leadership

Case Processing Summary

		N	%
Cases	Valid	216	98.6
	Excluded[a]	3	1.4
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.812	.815	9

Item Statistics

	Mean	Std. Deviation	N
L1	3.48	1.011	216
L2	3.56	.977	216
L3	3.79	.888	216
L4	3.49	.974	216
L5	3.37	1.012	216
L6	3.85	.830	216
L7	3.35	.962	216
L8	3.26	1.091	216
L9	3.83	.915	216

Inter-Item Correlation Matrix

	L1	L2	L3	L4	L5	L6	L7	L8	L9
L1	1.000	.574	.479	.217	.186	.254	.226	.088	.091
L2	.574	1.000	.597	.165	.117	.279	.186	-.027	.075
L3	.479	.597	1.000	.333	.272	.380	.346	.134	.323
L4	.217	.165	.333	1.000	.656	.392	.534	.456	.378
L5	.186	.117	.272	.656	1.000	.367	.565	.543	.348
L6	.254	.279	.380	.392	.367	1.000	.434	.245	.395
L7	.226	.186	.346	.534	.565	.434	1.000	.444	.351
L8	.088	-.027	.134	.456	.543	.245	.444	1.000	.422
L9	.091	.075	.323	.378	.348	.395	.351	.422	1.000

The covariance matrix is calculated and used in the analysis.

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.553	3.264	3.847	.583	1.179	.049	9
Inter-Item Correlations	.328	-.027	.656	.683	-24.270	.027	9

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
31.98	30.130	5.489	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
L1	28.50	25.079	.398	.371	.808
L2	28.42	25.584	.364	.487	.811
L3	28.19	24.443	.558	.487	.788
L4	28.50	23.293	.626	.502	.778
L5	28.61	23.150	.611	.543	.780
L6	28.13	25.019	.533	.319	.791
L7	28.63	23.480	.614	.436	.780
L8	28.72	24.157	.446	.394	.803
L9	28.15	25.085	.459	.323	.799

Appendix D6: Cronbach's alpha for performance

Case Processing Summary

		N	%
Cases	Valid	207	94.5
	Excluded[a]	12	5.5
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.826	.826	2

Item Statistics

	Mean	Std. Deviation	N
P1	3.62	.866	207
P2	3.55	.912	207

Inter-Item Correlation Matrix

	Performance	Performance
P1	1.000	.704
P2	.704	1.000

The covariance matrix is calculated and used in the analysis.

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.585	3.546	3.623	.077	1.022	.003	2
Inter-Item Correlations	.704	.704	.704	.000	1.000	.000	2

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
7.17	2.695	1.642	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
P1	3.55	.832	.704	.496	.[a]
P2	3.62	.751	.704	.496	.[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Appendix D7: Cronbach's alpha for organizational structure

Case Processing Summary

		N	%
Cases	Valid	212	96.8
	Excluded[a]	7	3.2
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.846	.847	7

Item Statistics

	Mean	Std. Deviation	N
OS1	4.83	1.814	212
OS2	4.75	1.703	212
OS3	4.37	1.637	212
OS4	4.36	1.659	212
OS5	3.85	1.726	212
OS6	3.71	1.811	212
OS7	3.96	1.611	212

Inter-Item Correlation Matrix

	OS1	OS2	OS3	OS4	OS5	OS6	OS7
OS1	1.000	.498	.395	.433	.435	.349	.463
OS2	.498	1.000	.512	.408	.431	.326	.395
OS3	.395	.512	1.000	.390	.412	.261	.372
OS4	.433	.408	.390	1.000	.515	.388	.406
OS5	.435	.431	.412	.515	1.000	.641	.635
OS6	.349	.326	.261	.388	.641	1.000	.602
OS7	.463	.395	.372	.406	.635	.602	1.000

The covariance matrix is calculated and used in the analysis.

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.261	3.708	4.825	1.118	1.302	.189	7
Inter-Item Correlations	.441	.261	.641	.381	2.460	.009	7

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
29.83	74.581	8.636	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
OS1	25.00	55.526	.583	.369	.829
OS2	25.08	56.728	.583	.395	.828
OS3	25.45	58.742	.524	.336	.836
OS4	25.47	57.340	.577	.349	.829
OS5	25.97	53.525	.716	.576	.808
OS6	26.12	55.593	.582	.480	.829
OS7	25.86	55.929	.666	.508	.816

Appendix D8: Cronbach's alpha for level of codification (all items)

Case Processing Summary

		N	%
Cases	Valid	205	93.6
	Excluded[a]	14	6.4
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.567	.568	9

Item Statistics

	Mean	Std. Deviation	N
LC1	4.64	1.784	205
LC2	4.18	1.815	205
LC3	3.92	1.716	205
LC4	4.21	1.931	205
LC5	4.39	1.643	205
LC6	3.43	1.452	205
LC7	3.55	1.658	205
LC8	4.28	1.536	205
LC9	4.38	1.515	205

Inter-Item Correlation Matrix

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8	LC9
LC1	1.000	.185	.050	.082	.136	.037	.103	.062	.033
LC2	.185	1.000	.368	.063	.006	.158	.099	.270	.022
LC3	.050	.368	1.000	.008	.007	.185	.182	.228	.053
LC4	.082	.063	.008	1.000	.310	.136	.239	.145	.182
LC5	.136	.006	.007	.310	1.000	.081	.064	.218	.104
LC6	.037	.158	.185	.136	.081	1.000	.239	.134	-.023
LC7	.103	.099	.182	.239	.064	.239	1.000	.181	.150
LC8	.062	.270	.228	.145	.218	.134	.181	1.000	.089
LC9	.033	.022	.053	.182	.104	-.023	.150	.089	1.000

The covariance matrix is calculated and used in the analysis.

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.110	3.434	4.644	1.210	1.352	.161	9
Inter-Item Correlations	.127	-.023	.368	.391	-15.838	.008	9

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
36.99	51.176	7.154	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC1	32.35	43.806	.177	.061	.564
LC2	32.81	40.861	.302	.208	.526
LC3	33.07	42.103	.275	.184	.534
LC4	32.78	40.204	.296	.170	.528
LC5	32.60	43.280	.240	.149	.544
LC6	33.56	44.326	.245	.102	.543
LC7	33.44	41.483	.325	.149	.520
LC8	32.71	41.875	.349	.158	.515
LC9	32.61	45.660	.157	.057	.565

Appendix D9: Cronbach's alpha for level of codification (LC1 to LC8)

Case Processing Summary

		N	%
Cases	Valid	207	94.5
	Excluded[a]	12	5.5
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.564	.568	8

Inter-Item Correlation Matrix

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8
LC1	1.000	.180	.048	.084	.131	.039	.097	.057
LC2	.180	1.000	.368	.061	.010	.155	.102	.272
LC3	.048	.368	1.000	.006	.016	.177	.185	.234
LC4	.084	.061	.006	1.000	.306	.138	.236	.141
LC5	.131	.010	.016	.306	1.000	.072	.069	.226
LC6	.039	.155	.177	.138	.072	1.000	.233	.124
LC7	.097	.102	.185	.236	.069	.233	1.000	.187
LC8	.057	.272	.234	.141	.226	.124	.187	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
32.58	45.381	6.737	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC1	27.94	38.331	.176	.056	.564
LC2	28.40	35.241	.320	.206	.514
LC3	28.67	36.571	.283	.184	.527
LC4	28.36	35.611	.265	.151	.535
LC5	28.20	37.968	.233	.145	.544
LC6	29.14	38.603	.259	.090	.536
LC7	29.04	36.465	.309	.136	.519
LC8	28.31	36.477	.352	.162	.507

Appendix D10: Cronbach's alpha for level of codification (LC2 to LC8)

Case Processing Summary

		N	%
Cases	Valid	207	94.5
	Excluded[a]	12	5.5
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.564	.568	7

Inter-Item Correlation Matrix

	LC2	LC3	LC4	LC5	LC6	LC7	LC8
LC2	1.000	.368	.061	.010	.155	.102	.272
LC3	.368	1.000	.006	.016	.177	.185	.234
LC4	.061	.006	1.000	.306	.138	.236	.141
LC5	.010	.016	.306	1.000	.072	.069	.226
LC6	.155	.177	.138	.072	1.000	.233	.124
LC7	.102	.185	.236	.069	.233	1.000	.187
LC8	.272	.234	.141	.226	.124	.187	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
27.94	38.331	6.191	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC2	23.76	29.349	.291	.181	.524
LC3	24.03	29.815	.298	.184	.521
LC4	23.72	29.135	.265	.150	.536
LC5	23.56	31.684	.213	.133	.552
LC6	24.49	31.756	.274	.090	.531
LC7	24.40	29.988	.310	.131	.517
LC8	23.67	29.738	.372	.161	.496

Appendix D11: Cronbach's alpha for level of codification (LC2, LC3, LC4, LC6, LC7 and LC8)

Case Processing Summary

		N	%
Cases	Valid	207	94.5
	Excluded[a]	12	5.5
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.552	.559	6

Inter-Item Correlation Matrix

	LC2	LC3	LC4	LC6	LC7	LC8
LC2	1.000	.368	.061	.155	.102	.272
LC3	.368	1.000	.006	.177	.185	.234
LC4	.061	.006	1.000	.138	.236	.141
LC6	.155	.177	.138	1.000	.233	.124
LC7	.102	.185	.236	.233	1.000	.187
LC8	.272	.234	.141	.124	.187	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
23.56	31.684	5.629	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC2	19.38	22.761	.327	.179	.490
LC3	19.65	23.257	.332	.183	.488
LC4	19.34	24.421	.188	.077	.563
LC6	20.12	25.453	.282	.089	.513
LC7	20.02	23.718	.325	.130	.493
LC8	19.29	24.236	.336	.124	.490

Appendix D12 Cronbach's alpha for level of codification (LC2, LC3, LC6, LC7 and LC8)

Case Processing Summary

		N	%
Cases	Valid	207	94.5
	Excluded[a]	12	5.5
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.563	.561	5

Inter-Item Correlation Matrix

	LC2	LC3	LC6	LC7	LC8
LC2	1.000	.368	.155	.102	.272
LC3	.368	1.000	.177	.185	.234
LC6	.155	.177	1.000	.233	.124
LC7	.102	.185	.233	1.000	.187
LC8	.272	.234	.124	.187	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
19.34	24.421	4.942	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC2	15.16	15.924	.362	.178	.484
LC3	15.43	16.033	.397	.178	.462
LC6	15.90	18.956	.266	.082	.538
LC7	15.80	17.956	.266	.093	.540
LC8	15.07	17.805	.328	.115	.506

Appendix D13: Cronbach's alpha for level of codification (LC2, LC3, LC6 and LC8)

Case Processing Summary

		N	%
Cases	Valid	208	95.0
	Excluded[a]	11	5.0
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.540	.532	4

Inter-Item Correlation Matrix

	LC2	LC3	LC6	LC8
LC2	1.000	.372	.153	.271
LC3	.372	1.000	.174	.232
LC6	.153	.174	1.000	.125
LC8	.271	.232	.125	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
15.82	17.918	4.233	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC2	11.63	10.031	.402	.180	.395
LC3	11.90	10.574	.394	.169	.405
LC6	12.38	13.607	.208	.044	.555
LC8	11.55	12.288	.305	.098	.485

Appendix D14: Cronbach's alpha for level of codification (LC2, LC3 and LC8)

Case Processing Summary

		N	%
Cases	Valid	209	95.4
	Excluded[a]	10	4.6
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.555	.553	3

Inter-Item Correlation Matrix

	LC2	LC3	LC8
LC2	1.000	.372	.269
LC3	.372	1.000	.235
LC8	.269	.235	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
12.35	13.634	3.692	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC2	8.17	6.573	.411	.173	.379
LC3	8.44	7.151	.387	.158	.420
LC8	8.10	8.495	.305	.093	.542

Appendix D15: Cronbach's alpha for level of codification (LC2 and LC3)

Case Processing Summary

		N	%
Cases	Valid	215	98.2
	Excluded[a]	4	1.8
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.545	.546	2

Inter-Item Correlation Matrix

	LC2	LC3
LC2	1.000	.375
LC3	.375	1.000

The covariance matrix is calculated and used in the analysis.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC2	3.89	2.900	.375	.141	.[a]
LC3	4.16	3.230	.375	.141	.[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
8.06	8.427	2.903	2

Appendix D16: PCA on all scale variables

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
OC1	3.65	.971	186
OC2	3.61	.953	186
OC3	3.62	.935	186
OC4	3.89	.896	186
OC5	3.76	.980	186
OC6	3.86	.965	186
OC7	3.91	1.015	186
OC8	3.27	1.150	186
OC9	4.06	.948	186
OC10	4.08	.818	186
OC11	3.64	1.037	186
OC12	3.74	.940	186
OC13	3.94	.976	186
L1	3.51	1.009	186
L2	3.54	1.008	186
L3	3.80	.913	186
L4	3.45	.992	186
L5	3.33	1.027	186
L6	3.83	.818	186
L7	3.34	.980	186
L8	3.23	1.107	186
L9	3.81	.931	186
P1	3.66	.888	186
P2	3.56	.917	186
OS1	4.91	1.767	186
OS2	4.76	1.731	186
OS3	4.36	1.636	186
OS4	4.44	1.617	186
OS5	3.86	1.712	186
OS6	3.72	1.830	186
OS7	4.01	1.619	186
LC1	4.59	1.817	186
LC2	4.15	1.832	186
LC3	3.92	1.711	186
LC4	4.18	1.955	186
LC5	4.32	1.644	186
LC6	3.41	1.450	186
LC7	3.55	1.667	186
LC8	4.27	1.530	186
LC9	4.35	1.511	186

NOTE: The table for correlation matrix is omitted, since the whole table is not able to be fitted within the page width.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.772
Bartlett's Test of Sphericity	Approx. Chi-Square	2799.688
	df	780
	Sig.	.000

Communalities

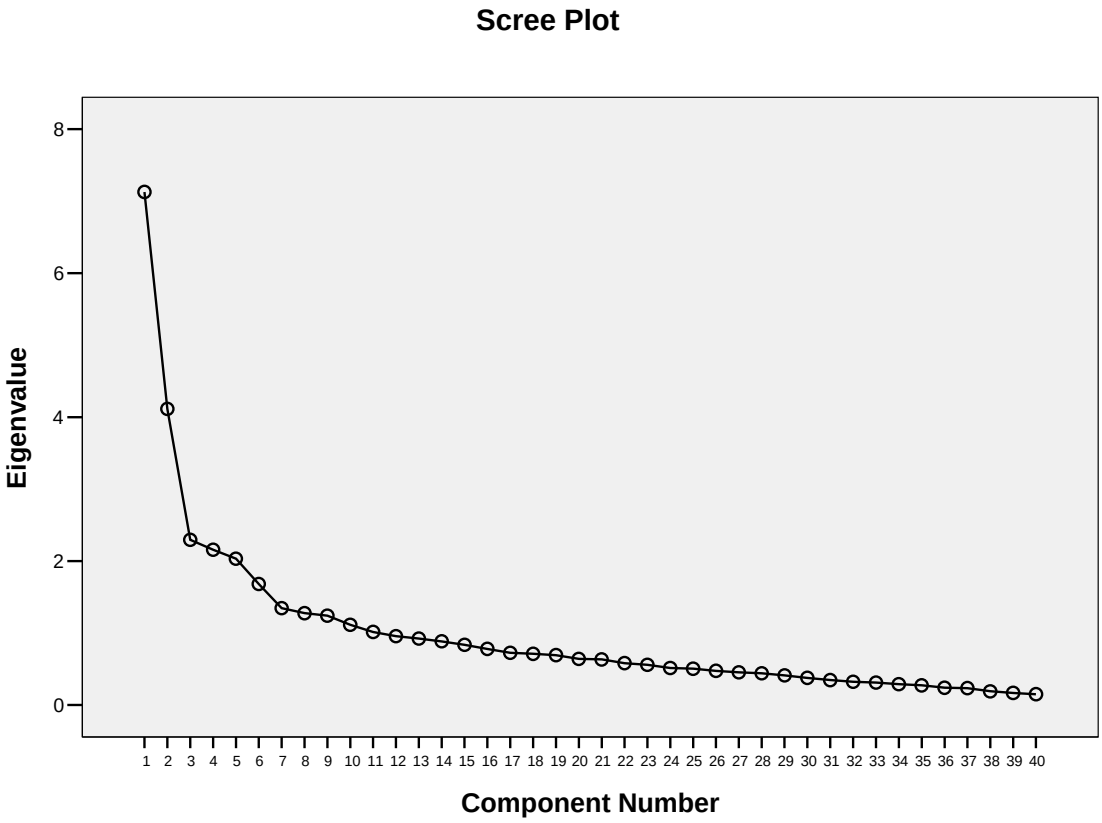
	Initial	Extraction
OC1	1.000	.491
OC2	1.000	.584
OC3	1.000	.553
OC4	1.000	.549
OC5	1.000	.637
OC6	1.000	.572
OC7	1.000	.521
OC8	1.000	.625
OC9	1.000	.614
OC10	1.000	.609
OC11	1.000	.617
OC12	1.000	.548
OC13	1.000	.677
L1	1.000	.708
L2	1.000	.789
L3	1.000	.687
L4	1.000	.688
L5	1.000	.750
L6	1.000	.581
L7	1.000	.644
L8	1.000	.678
L9	1.000	.546
P1	1.000	.821
P2	1.000	.815
OS1	1.000	.651
OS2	1.000	.620
OS3	1.000	.589
OS4	1.000	.627
OS5	1.000	.757
OS6	1.000	.634
OS7	1.000	.758
LC1	1.000	.699
LC2	1.000	.658
LC3	1.000	.634
LC4	1.000	.637
LC5	1.000	.630
LC6	1.000	.577
LC7	1.000	.557
LC8	1.000	.568
LC9	1.000	.498

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %
1	7.129	17.821	17.821	7.129	17.821	17.821	4.855	12.138	12.138
2	4.114	10.284	28.106	4.114	10.284	28.106	3.907	9.768	21.906
3	2.295	5.737	33.842	2.295	5.737	33.842	3.218	8.045	29.951
4	2.157	5.392	39.234	2.157	5.392	39.234	2.457	6.142	36.093
5	2.033	5.082	44.316	2.033	5.082	44.316	2.015	5.038	41.131
6	1.681	4.203	48.519	1.681	4.203	48.519	1.713	4.281	45.412
7	1.345	3.363	51.882	1.345	3.363	51.882	1.710	4.275	49.687
8	1.275	3.188	55.070	1.275	3.188	55.070	1.514	3.785	53.471
9	1.241	3.102	58.173	1.241	3.102	58.173	1.431	3.577	57.048
10	1.114	2.786	60.958	1.114	2.786	60.958	1.295	3.238	60.286
11	1.014	2.535	63.493	1.014	2.535	63.493	1.283	3.207	63.493
12	.955	2.388	65.882						
13	.922	2.306	68.187						
14	.884	2.210	70.398						
15	.835	2.087	72.485						
16	.779	1.948	74.433						
17	.725	1.812	76.245						
18	.711	1.777	78.022						
19	.692	1.730	79.752						
20	.641	1.601	81.353						
21	.633	1.582	82.935						
22	.581	1.452	84.387						
23	.558	1.396	85.783						
24	.513	1.282	87.065						
25	.504	1.259	88.324						
26	.474	1.184	89.508						
27	.453	1.133	90.641						
28	.439	1.098	91.739						
29	.411	1.027	92.766						
30	.376	.941	93.707						
31	.345	.863	94.570						
32	.322	.805	95.375						
33	.310	.776	96.151						
34	.289	.722	96.872						
35	.273	.682	97.554						
36	.239	.598	98.152						
37	.234	.584	98.736						
38	.189	.474	99.210						
39	.167	.417	99.627						
40	.149	.373	100.000						

Extraction Method: Principal Component Analysis.


Scree Plot
Eigenvalue
8
6
4
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Component Number

Component Matrix (a)

	Component										
	1	2	3	4	5	6	7	8	9	10	11
OC2	.683										
OC5	.647									-.321	
OC1	.643										
OC6	.637										
L9	.616										
OC10	.607										
OC7	.602										
OC9	.591										
L3	.567				-.363	.383					
L6	.567										
OC4	.515							.320			
L7	.483	-.323	.440								
OC13	.452								-.359		.342
OC8	.441				.312						.392
OS5		.778									
OS7		.772									
OS6		.704									
OS4		.632									
OS2		.632						-.318			
OS3		.589						-.364			
OS1	.424	.567									
L5	.491		.556								
L4	.451	-.309	.551								
L8	.372		.454	-.331							
LC7	-.314			.567							
LC8				.533							
LC3				.417					.301		
LC6				.408				.315			.335
LC9				.302							
L2	.335	-.324			-.594	.377					
L1	.424				-.530	.303					
LC2				.381	.428		.426				
OC11	.376				.428			.317			
P1	.509				-.325	-.603					
P2	.477					-.572					
LC1							.442			-.431	
OC3	.322						-.408				
LC5				.301			-.333	.432			
OC12	.350								-.587		
LC4			.340	.369							.378

Extraction Method: Principal Component Analysis.
a. 11 components extracted.

Rotated Component Matrix (a)

	Component										
	1	2	3	4	5	6	7	8	9	10	11
OC5	.715										
OC2	.709										
OC6	.704										
OC9	.662										
OC1	.607										
OC10	.599							.430			
OC8	.584										
OC7	.565			.361							
OC4	.565								.391		
OC3	.476								.427	-.335	
OS5		.852									
OS7		.815									
OS6		.751									
OS4		.676									
OS2		.640									.316
OS1	.301	.630									
OS3		.595					.306				
L5			.827								
L4			.794								
L7			.735								
L8			.732								
L9	.440		.472								
L6	.367		.388								
L2				.860							
L1				.785							
L3	.336			.706							
P2					.855						
P1					.837						
LC3						.722					
LC2						.710					
LC8						.542			.346		
LC4							.638				
LC9							.604				
LC7							.504				
OC12								.628			
OC13								.602			
OC11							-.405	.470			
LC5									.693		
LC1										.808	
LC6											-.657

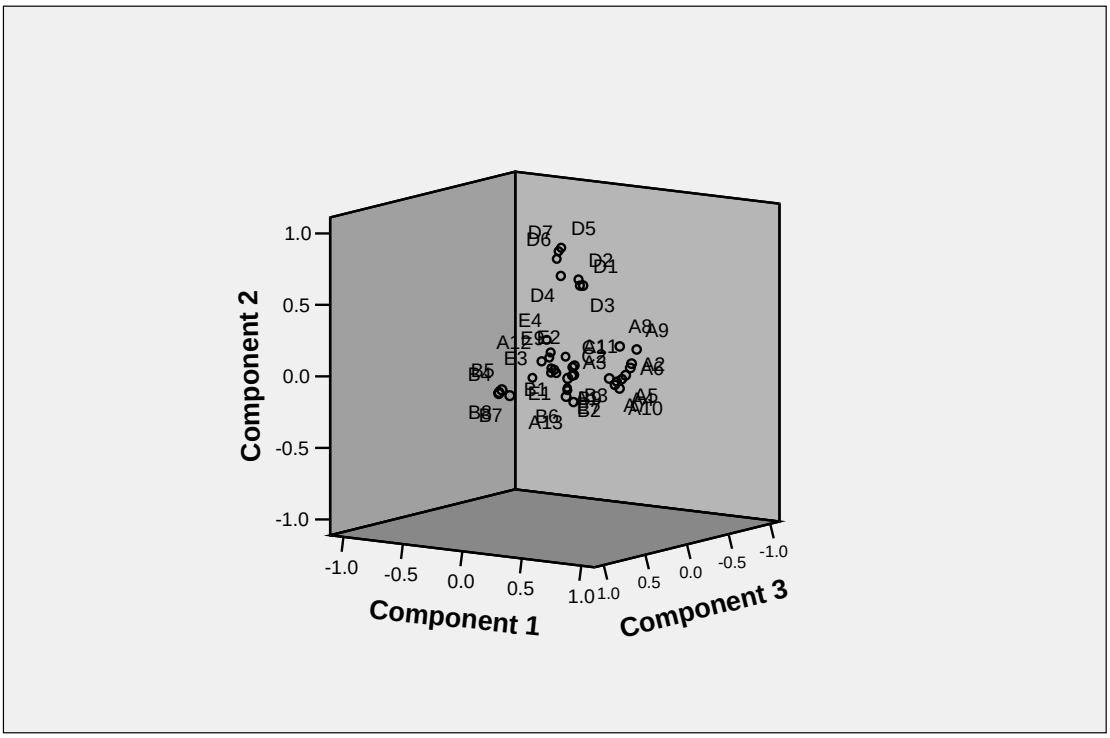
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 11 iterations.

Component Transformation Matrix

	1	2	3	4	5	6	7	8	9	10	11
1	.743	.181	.421	.299	.268	-.103	.005	.211	.076	-.008	.124
2	.083	.908	-.296	-.235	-.091	.027	.094	-.050	.067	.030	.014
3	-.457	.220	.711	-.016	.045	.243	.331	.065	.143	.197	-.056
4	.251	-.176	-.319	.217	-.180	.554	.521	.098	.282	.135	-.195
5	.300	-.138	.237	-.701	-.325	.367	-.279	.155	.017	-.027	.027
6	-.043	.162	.165	.496	-.720	.071	-.271	.044	-.132	-.258	-.124
7	.038	.084	-.050	.117	.188	.291	-.258	.069	-.615	.547	-.326
8	-.067	.041	-.030	.063	.172	-.017	-.503	.035	.648	.108	-.523
9	.162	.018	.157	.000	.164	.270	.000	-.842	-.081	-.305	-.202
10	-.190	.093	-.103	.065	.410	.438	-.126	.398	-.122	-.625	.034
11	.094	-.022	.075	-.221	-.037	-.364	.352	.202	-.228	-.282	-.711

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Plot in Rotated Space



Appendix D17: PCA on independent variables

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
OC1	3.63	.978	206
OC2	3.62	.944	206
OC3	3.63	.932	206
OC4	3.87	.891	206
OC5	3.78	.972	206
OC6	3.89	.949	206
OC7	3.90	.998	206
OC8	3.28	1.125	206
OC9	4.07	.942	206
OC10	4.09	.804	206
OC11	3.67	1.017	206
OC12	3.74	.930	206
OC13	3.94	.946	206
L1	3.50	1.001	206
L2	3.56	.985	206
L3	3.80	.904	206
L4	3.48	.976	206
L5	3.34	1.018	206
L6	3.84	.831	206
L7	3.33	.967	206
L8	3.24	1.100	206
L9	3.83	.924	206
OS1	4.84	1.790	206
OS2	4.75	1.723	206
OS3	4.40	1.631	206
OS4	4.39	1.649	206
OS5	3.84	1.724	206
OS6	3.68	1.814	206
OS7	3.97	1.612	206

NOTE: The table for correlation matrix is omitted, since the whole table is not able to be fitted within the page width.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.831
Bartlett's Test of Sphericity	Approx. Chi-Square	2278.397
	df	406
	Sig.	.000

Communalities

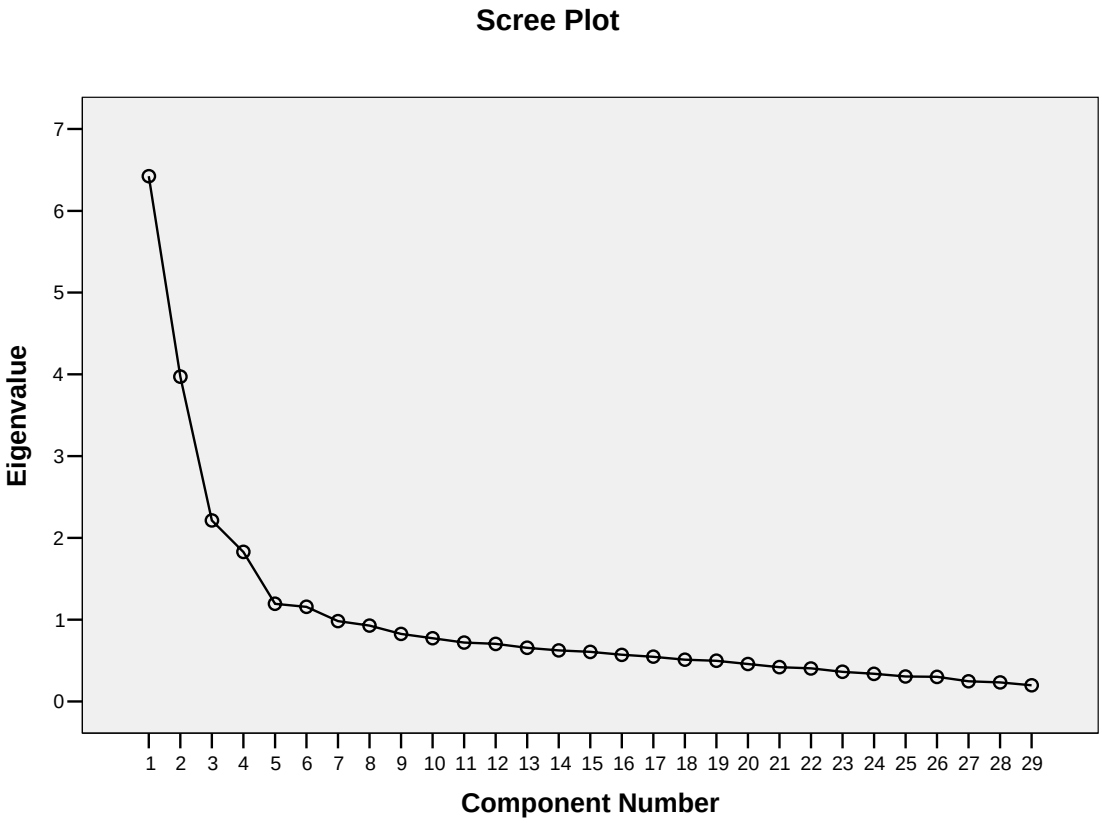
	Initial	Extraction
OC1	1.000	.452
OC2	1.000	.573
OC3	1.000	.501
OC4	1.000	.492
OC5	1.000	.546
OC6	1.000	.526
OC7	1.000	.462
OC8	1.000	.404
OC9	1.000	.545
OC10	1.000	.568
OC11	1.000	.644
OC12	1.000	.517
OC13	1.000	.570
L1	1.000	.672
L2	1.000	.777
L3	1.000	.683
L4	1.000	.663
L5	1.000	.696
L6	1.000	.505
L7	1.000	.625
L8	1.000	.599
L9	1.000	.562
OS1	1.000	.557
OS2	1.000	.548
OS3	1.000	.570
OS4	1.000	.547
OS5	1.000	.720
OS6	1.000	.583
OS7	1.000	.685

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %
1	6.424	22.153	22.153	6.424	22.153	22.153	4.681	16.142	16.142
2	6.424	22.153	22.153	6.424	22.153	22.153	4.681	16.142	29.241
3	3.972	13.698	35.850	3.972	13.698	35.850	3.799	13.099	40.064
4	2.213	7.633	43.483	2.213	7.633	43.483	3.139	10.823	48.227
5	1.829	6.307	49.790	1.829	6.307	49.790	2.367	8.164	53.414
6	1.195	4.119	53.910	1.195	4.119	53.910	1.504	5.187	57.901
7	1.157	3.991	57.901	1.157	3.991	57.901	1.301	4.487	
8	.982	3.387	61.288						
9	.928	3.199	64.487						
10	.826	2.848	67.335						
11	.774	2.667	70.002						
12	.720	2.483	72.486						
13	.704	2.428	74.913						
14	.656	2.263	77.176						
15	.624	2.150	79.326						
16	.606	2.090	81.416						
17	.570	1.966	83.383						
18	.547	1.888	85.270						
19	.511	1.761	87.032						
20	.498	1.716	88.748						
21	.457	1.577	90.325						
22	.419	1.445	91.770						
23	.404	1.392	93.162						
24	.363	1.251	94.413						
25	.338	1.164	95.577						
26	.305	1.052	96.630						
27	.300	1.036	97.666						
28	.247	.850	98.516						
29	.233	.803	99.319						

Extraction Method: Principal Component Analysis.


Scree Plot
Eigenvalue
0
1
2
3
4
5
6
7
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
Component Number

Component Matrix[a]

	Component					
	1	2	3	4	5	6
OC2	.676					
OC6	.645					
OC5	.645					
OC10	.622					
OC1	.620					
OC7	.618					
OC9	.617					
L9	.610					-.320
L3	.597			.512		
L6	.568					
OC4	.539		-.310			
OC8	.458					
OS5		.764				
OS7		.762				
OS6		.696				
OS4		.648				
OS2		.643				
OS1	.374	.592				
OS3		.568				-.371
L5	.477	-.310	.556			
L4	.474	-.346	.532			
L8	.364		.527	-.364		
L7	.494	-.329	.515			
L2	.357	-.313		.732		
L1	.394			.623		
OC12	.374				.595	
OC13	.450				.521	
OC3	.339		-.352		-.353	.329
OC11	.384			-.374		.542

Extraction Method: Principal Component Analysis.

a. 6 components extracted.

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
OC2	.732					
OC5	.711					
OC6	.705					
OC9	.662					
OC1	.635					
OC10	.577				.424	
OC4	.557					.375
OC7	.533			.358		
OC8	.492					
OC3	.477				-.308	.417
OS5		.834				
OS7		.808				
OS6		.738				
OS4		.698				
OS1		.660				
OS2		.658				
OS3		.598				-.376
L5			.812			
L4			.778			
L8			.758			
L7			.733			
L9	.495		.509			
L6	.403		.461	.302		
L2				.857		
L1				.794		
L3	.315			.721		
OC12					.661	
OC13					.641	
OC11						.689

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

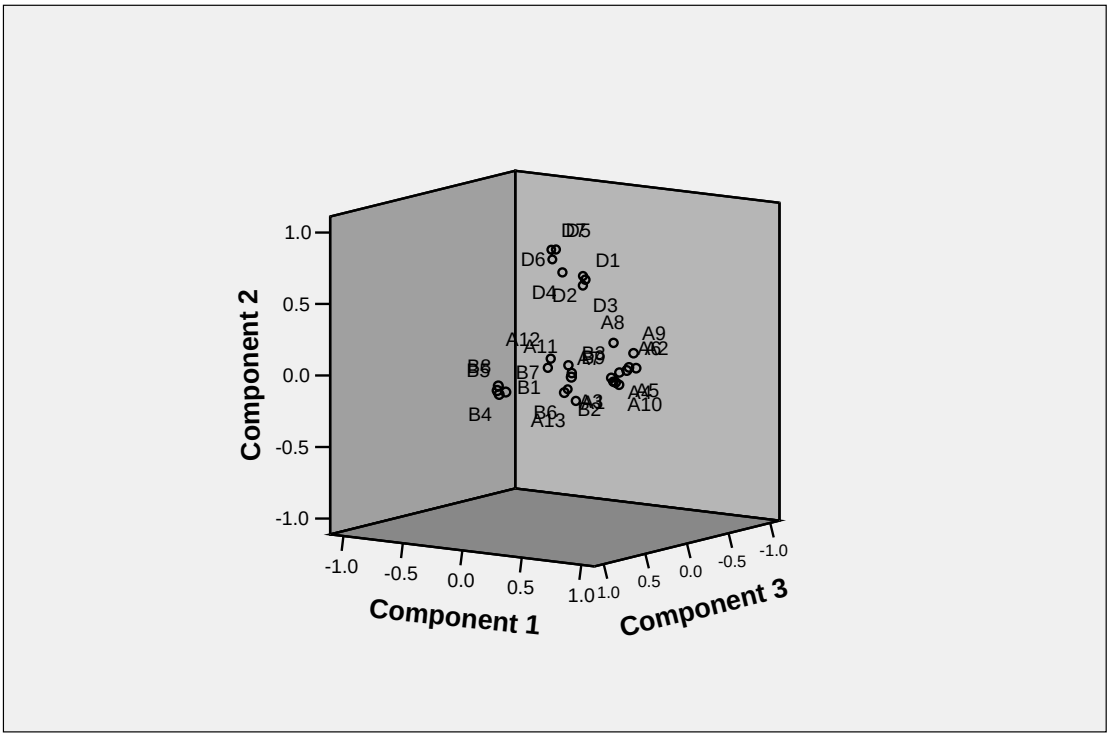
a. Rotation converged in 6 iterations.

Component Transformation Matrix

Component	1	2	3	4	5	6
1	.778	.178	.437	.323	.239	.104
2	.087	.912	-.324	-.227	-.063	.000
3	-.525	.341	.761	.072	.034	-.150
4	-.173	.121	-.317	.873	.008	-.305
5	-.191	.011	-.155	-.075	.963	.084
6	-.211	.074	-.016	.268	-.105	.931

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Plot in Rotated Space



Appendix D18: PCA on mediating and dependent variables

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
P1	3.65	.876	194
P2	3.56	.910	194
LC1	4.62	1.800	194
LC2	4.16	1.831	194
LC3	3.94	1.714	194
LC4	4.19	1.945	194
LC5	4.35	1.632	194
LC6	3.40	1.440	194
LC7	3.55	1.648	194
LC8	4.27	1.538	194
LC9	4.37	1.525	194

NOTE: The table for correlation matrix is omitted, since the whole table is not able to be fitted within the page width.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.601
Bartlett's Test of Sphericity	Approx. Chi-Square	348.345
	df	55
	Sig.	.000

Communalities

	Initial	Extraction
P1	1.000	.842
P2	1.000	.800
LC1	1.000	.353
LC2	1.000	.653
LC3	1.000	.519
LC4	1.000	.570
LC5	1.000	.667
LC6	1.000	.367
LC7	1.000	.663
LC8	1.000	.517
LC9	1.000	.452

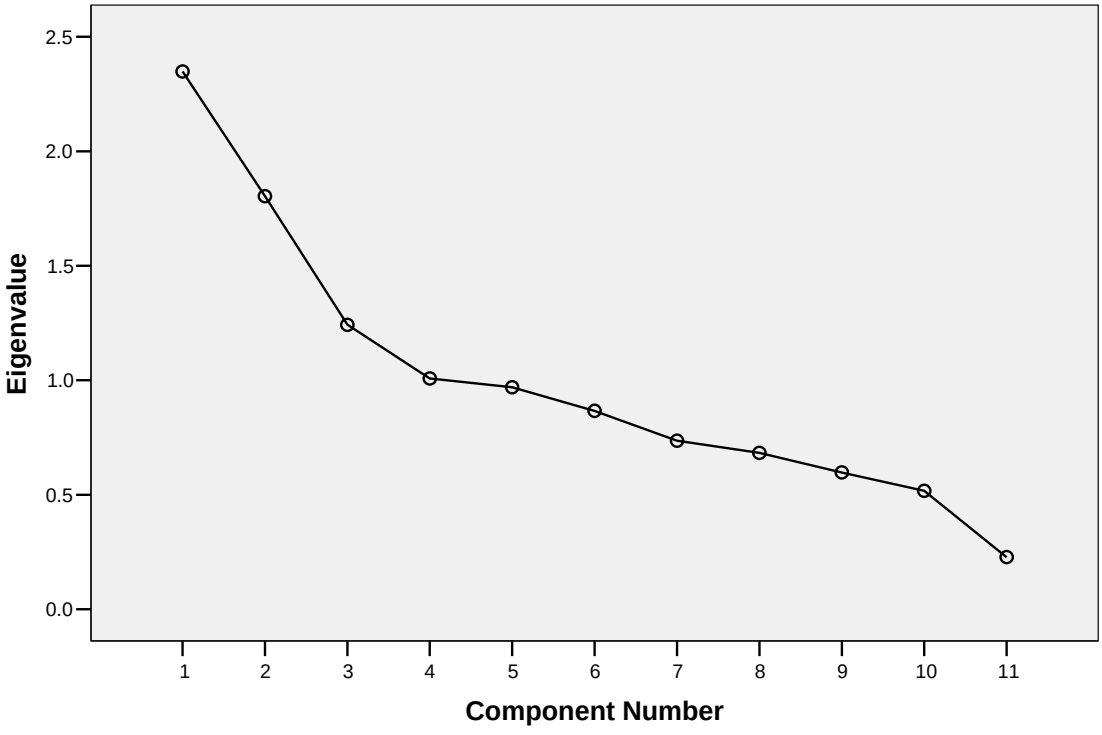
Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %
1	2.349	21.351	21.351	2.349	21.351	21.351	1.963	17.849	17.849
2	1.804	16.401	37.752	1.804	16.401	37.752	1.596	14.509	32.358
3	1.242	11.295	49.047	1.242	11.295	49.047	1.468	13.348	45.706
4	1.008	9.161	58.208	1.008	9.161	58.208	1.375	12.501	58.208
5	.970	8.814	67.021						
6	.866	7.877	74.899						
7	.736	6.690	81.589						
8	.683	6.207	87.796						
9	.597	5.431	93.228						
10	.517	4.703	97.931						
11	.228	2.069	100.000						

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix[a]

	Component			
	1	2	3	4
P1	-.681	.580		
P2	-.662	.487	.327	
LC3	.600		.390	
LC8	.521			-.391
LC6	.434			.398
LC5		.569		-.492
LC9		.547		.303
LC1		.433	.388	
LC2	.485		.602	
LC4	.316	.467	-.498	
LC7	.520			.548

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
P1	.906			
P2	.882			
LC2		.805		
LC3		.621		
LC1	.316	.483		
LC5			.798	
LC4			.663	.349
LC8		.480	.488	
LC7				.793
LC6				.540
LC9	.333		.325	.479

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

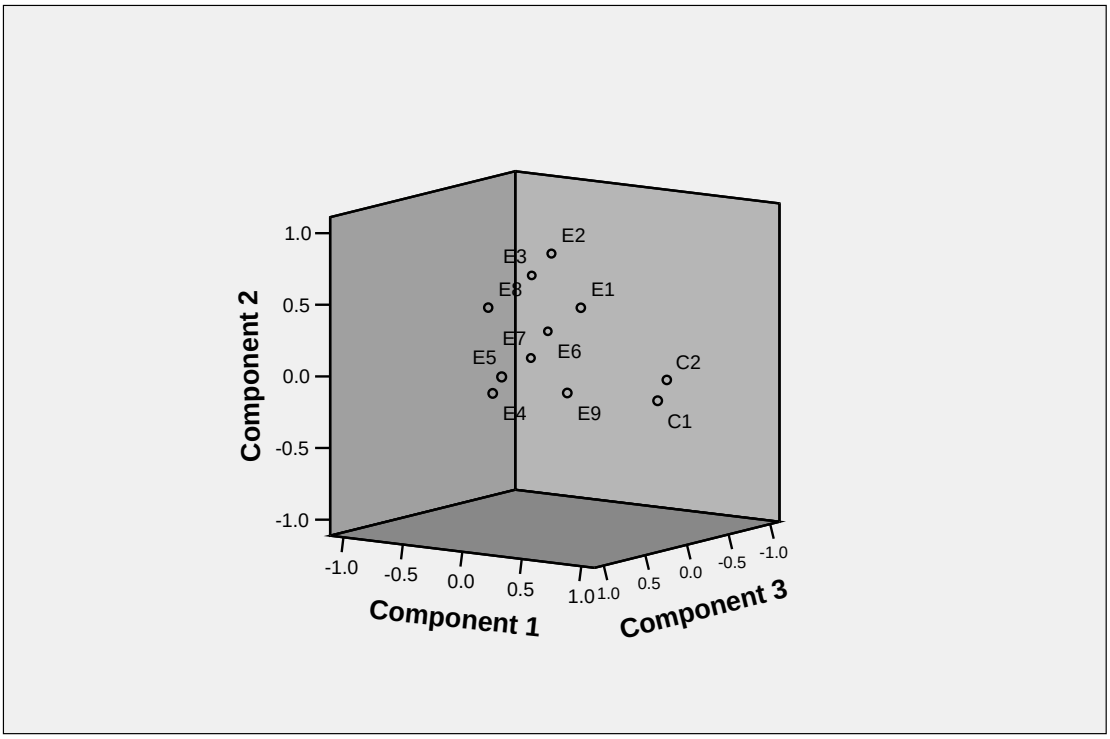
a. Rotation converged in 7 iterations.

Component Transformation Matrix

Component	1	2	3	4
1	-.665	.539	.238	.459
2	.657	.272	.635	.303
3	.285	.774	-.519	-.225
4	.213	-.193	-.520	.804

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Plot in Rotated Space



Appendix D19: Cronbach's alpha for organizational culture (OC1 to OC10)

Case Processing Summary

		N	%
Cases	Valid	218	99.5
	Excluded[a]	1	.5
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.844	.846	10

Inter-Item Correlation Matrix

	OC1	OC2	OC3	OC4	OC5	OC6	OC7	OC8	OC9	OC10
OC1	1.000	.571	.237	.361	.458	.425	.323	.244	.296	.402
OC2	.571	1.000	.302	.368	.476	.473	.393	.383	.454	.367
OC3	.237	.302	1.000	.303	.239	.221	.155	.214	.256	.235
OC4	.361	.368	.303	1.000	.385	.349	.362	.234	.351	.381
OC5	.458	.476	.239	.385	1.000	.518	.356	.292	.372	.360
OC6	.425	.473	.221	.349	.518	1.000	.403	.322	.492	.373
OC7	.323	.393	.155	.362	.356	.403	1.000	.307	.380	.430
OC8	.244	.383	.214	.234	.292	.322	.307	1.000	.363	.307
OC9	.296	.454	.256	.351	.372	.492	.380	.363	1.000	.498
OC10	.402	.367	.235	.381	.360	.373	.430	.307	.498	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
37.64	37.503	6.124	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
OC1	34.04	30.390	.563	.418	.827
OC2	34.04	29.837	.659	.484	.818
OC3	34.03	32.870	.356	.153	.845
OC4	33.78	31.525	.521	.291	.831
OC5	33.89	30.286	.592	.389	.824
OC6	33.76	30.323	.616	.423	.822
OC7	33.74	30.756	.525	.310	.831
OC8	34.37	30.723	.446	.222	.840
OC9	33.56	30.606	.590	.416	.825
OC10	33.56	31.731	.573	.380	.827

Appendix D20: Cronbach's alpha for leadership (L4 to L9)

Case Processing Summary

		N	%
Cases	Valid	216	98.6
	Excluded[a]	3	1.4
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.823	.822	6

Inter-Item Correlation Matrix

	L4	L5	L6	L7	L8	L9
L4	1.000	.656	.392	.534	.456	.378
L5	.656	1.000	.367	.565	.543	.348
L6	.392	.367	1.000	.434	.245	.395
L7	.534	.565	.434	1.000	.444	.351
L8	.456	.543	.245	.444	1.000	.422
L9	.378	.348	.395	.351	.422	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
21.15	17.876	4.228	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
L4	17.66	12.355	.668	.494	.778
L5	17.78	11.997	.692	.543	.772
L6	17.30	14.202	.477	.279	.816
L7	17.80	12.607	.636	.424	.785
L8	17.88	12.298	.573	.378	.800
L9	17.31	13.659	.500	.284	.813

Appendix D21: Cronbach's alpha for leadership (L1 to L3)

Case Processing Summary

		N	%
Cases	Valid	219	100.0
	Excluded[a]	0	.0
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.783	.784	3

Inter-Item Correlation Matrix

	L1	L2	L3
L1	1.000	.570	.479
L2	.570	1.000	.595
L3	.479	.595	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
10.84	5.722	2.392	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
L1	7.36	2.744	.590	.355	.744
L2	7.28	2.642	.676	.459	.644
L3	7.05	3.071	.605	.383	.726

Appendix D22: Cronbach's alpha for level of codification (LC1, LC2 and LC3)

Case Processing Summary

		N	%
Cases	Valid	215	98.2
	Excluded[a]	4	1.8
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.420	.420	3

Inter-Item Correlation Matrix

	LC2	LC3	LC1
LC2	1.000	.375	.167
LC3	.375	1.000	.042
LC1	.167	.042	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
12.71	12.916	3.594	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC2	8.55	6.324	.372	.164	.080
LC3	8.82	7.467	.274	.141	.285
LC1	8.06	8.427	.128	.028	.545

Appendix D23: Cronbach's alpha for level of codification (LC4, LC5 and LC8)

Case Processing Summary

		N	%
Cases	Valid	212	96.8
	Excluded[a]	7	3.2
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.449	.452	3

Inter-Item Correlation Matrix

	LC5	LC4	LC8
LC5	1.000	.294	.235
LC4	.294	1.000	.118
LC8	.235	.118	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
12.81	12.609	3.551	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC5	8.47	6.810	.356	.127	.207
LC4	8.59	6.328	.265	.089	.380
LC8	8.56	8.304	.214	.058	.450

Appendix D24: Cronbach's alpha for level of codification (LC6, LC7 and LC9)

Case Processing Summary

		N	%
Cases	Valid	210	95.9
	Excluded[a]	9	4.1
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.295	.287	3

Inter-Item Correlation Matrix

	LC7	LC6	LC9
LC7	1.000	.249	.137
LC6	.249	1.000	-.031
LC9	.137	-.031	1.000

The covariance matrix is calculated and used in the analysis.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC7	7.83	4.254	.276	.083	-.064[a]
LC6	7.93	5.708	.153	.066	.240
LC9	7.00	6.014	.074	.023	.396

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
11.38	8.859	2.976	3

Appendix D25: Cronbach's alpha for level of codification (LC4, LC7 and LC9)

Case Processing Summary

		N	%
Cases	Valid	210	95.9
	Excluded[a]	9	4.1
	Total	219	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.412	.410	3

Inter-Item Correlation Matrix

	LC4	LC9	LC7
LC4	1.000	.182	.245
LC9	.182	1.000	.137
LC7	.245	.137	1.000

The covariance matrix is calculated and used in the analysis.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC4	7.93	5.708	.285	.083	.240
LC9	7.78	8.031	.204	.042	.390
LC7	8.61	7.099	.256	.069	.301

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
12.16	12.079	3.475	3

Appendix D26: Cronbach's alpha for level of codification (local-owned companies)

Case Processing Summary

		N	%
Cases	Valid	172	93.5
	Excluded[a]	12	6.5
	Total	184	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.513	.513	9

Inter-Item Correlation Matrix

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8	LC9
LC1	1.000	.173	.020	.040	.171	.006	.004	.032	-.034
LC2	.173	1.000	.346	.031	.019	.157	.070	.267	-.008
LC3	.020	.346	1.000	.017	-.054	.206	.154	.171	.039
LC4	.040	.031	.017	1.000	.299	.067	.244	.107	.166
LC5	.171	.019	-.054	.299	1.000	.079	.057	.182	.086
LC6	.006	.157	.206	.067	.079	1.000	.263	.122	-.045
LC7	.004	.070	.154	.244	.057	.263	1.000	.141	.123
LC8	.032	.267	.171	.107	.182	.122	.141	1.000	.050
LC9	-.034	-.008	.039	.166	.086	-.045	.123	.050	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
37.44	46.809	6.842	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC1	32.77	41.209	.112	.064	.522
LC2	33.17	37.088	.284	.197	.462
LC3	33.36	38.863	.242	.166	.478
LC4	33.24	36.978	.258	.155	.472
LC5	33.03	39.508	.230	.153	.482
LC6	34.02	40.245	.231	.119	.483
LC7	33.80	38.089	.285	.146	.464
LC8	33.09	38.723	.294	.125	.463
LC9	33.01	42.403	.103	.048	.520

Appendix D27: Cronbach's alpha for level of codification (foreign-owned companies)

Case Processing Summary

		N	%
Cases	Valid	33	94.3
	Excluded[a]	2	5.7
	Total	35	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.734	.740	9

Inter-Item Correlation Matrix

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	LC8	LC9
LC1	1.000	.237	.164	.289	-.015	.222	.618	.201	.371
LC2	.237	1.000	.410	.270	-.073	.205	.200	.229	.145
LC3	.164	.410	1.000	-.012	.291	.130	.211	.464	.022
LC4	.289	.270	-.012	1.000	.367	.565	.241	.380	.290
LC5	-.015	-.073	.291	.367	1.000	.095	.094	.408	.199
LC6	.222	.205	.130	.565	.095	1.000	.121	.240	.146
LC7	.618	.200	.211	.241	.094	.121	1.000	.369	.266
LC8	.201	.229	.464	.380	.408	.240	.369	1.000	.283
LC9	.371	.145	.022	.290	.199	.146	.266	.283	1.000

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
34.67	69.479	8.335	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
LC1	30.15	53.133	.440	.486	.706
LC2	30.94	57.996	.344	.372	.722
LC3	31.55	57.881	.352	.517	.720
LC4	30.36	51.551	.513	.602	.690
LC5	30.33	58.479	.283	.424	.734
LC6	31.12	60.235	.384	.380	.716
LC7	31.58	56.627	.476	.450	.700
LC8	30.73	55.205	.573	.454	.686
LC9	30.58	59.377	.377	.240	.716

Appendix D28: Bivariate correlations

Correlations[a]

		OS	OC	L
OS	Pearson Correlation	1	.201**	-.025
	Sig. (2-tailed)		.004	.725
OC	Pearson Correlation	.201**	1	.370**
	Sig. (2-tailed)	.004		.000
L	Pearson Correlation	-.025	.370**	1
	Sig. (2-tailed)	.725	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

a. Listwise N=208

Appendix D29: Multiple regression (scale variables)

Descriptive Statistics

	Mean	Std. Deviation	N
LC	36.91	7.213	196
OS	29.91	8.674	196
OC	37.83	6.156	196
L	21.08	4.259	196

Correlations

		LC	OS	OC	L
Pearson Correlation	LC	1.000	.087	-.076	-.058
	OS	.087	1.000	.216	-.009
	OC	-.076	.216	1.000	.373
	L	-.058	-.009	.373	1.000
Sig. (1-tailed)	LC	.	.114	.144	.209
	OS	.114	.	.001	.452
	OC	.144	.001	.	.000
	L	.209	.452	.000	.
N	LC	196	196	196	196
	OS	196	196	196	196
	OC	196	196	196	196
	L	196	196	196	196

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	L, OS, OC[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: LC

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.132[a]	.017	.002	7.206

a. Predictors: (Constant), L, OS, OC

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	176.781	3	58.927	1.135	.336[a]
	Residual	9969.566	192	51.925		
	Total	10146.347	195			

a. Predictors: (Constant), L, OS, OC

b. Dependent Variable: LC

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	39.124	3.758		10.410	.000		
	OS	.088	.061	.106	1.437	.152	.944	1.059
	OC	-.106	.093	-.090	-1.139	.256	.813	1.231
	L	-.040	.131	-.024	-.303	.762	.852	1.173

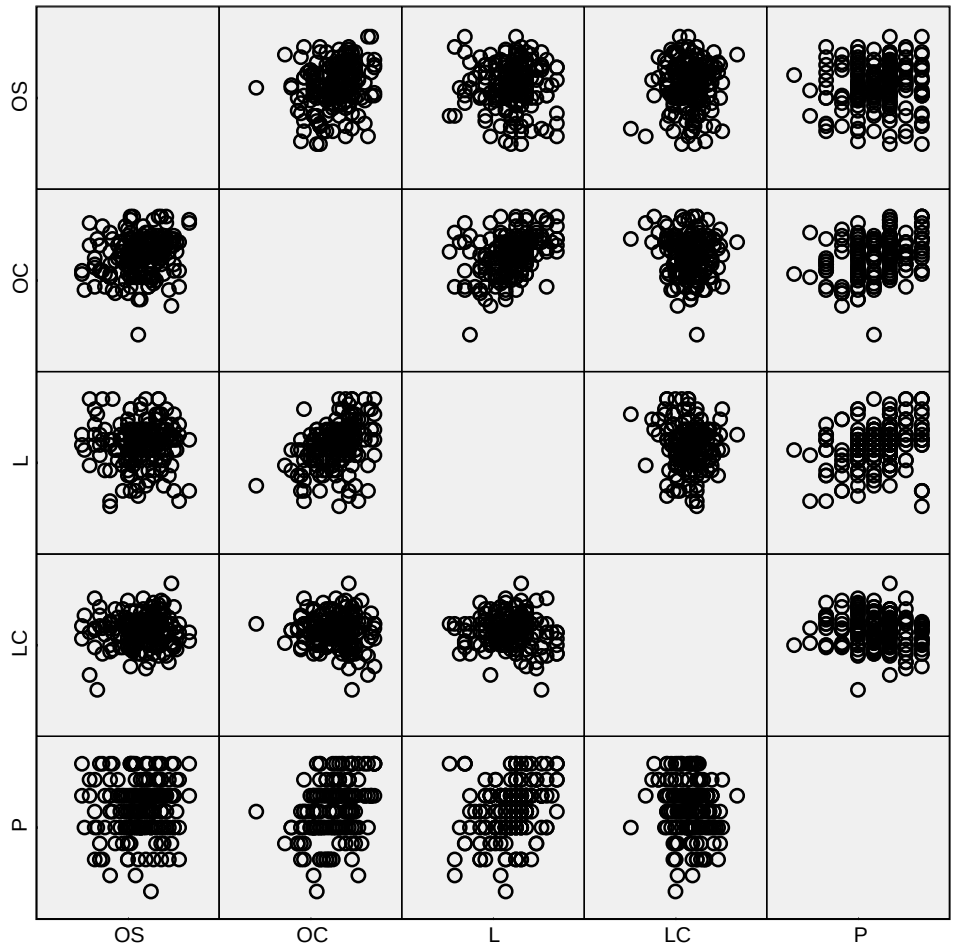
a. Dependent Variable: LC

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	OS	OC	L
1	1	3.903	1.000	.00	.00	.00	.00
	2	.064	7.801	.01	.80	.01	.12
	3	.020	14.093	.13	.18	.32	.86
	4	.013	17.486	.86	.01	.66	.02

a. Dependent Variable: LC

Appendix D30: Hierarchical multiple linear regression (scale variables)



Descriptive Statistics

	Mean	Std. Deviation	N
P	7.22	1.682	187
LC	36.74	7.232	187
OS	29.95	8.727	187
OC	37.71	6.240	187
L	20.99	4.227	187

Correlations

		P	LC	OS	OC	L
Pearson Correlation	P	1.000	-.116	.067	.330	.298
	LC	-.116	1.000	.078	-.095	-.077
	OS	.067	.078	1.000	.219	-.022
	OC	.330	-.095	.219	1.000	.381
	L	.298	-.077	-.022	.381	1.000
Sig. (1-tailed)	P	.	.058	.181	.000	.000
	LC	.058	.	.145	.097	.147
	OS	.181	.145	.	.001	.380
	OC	.000	.097	.001	.	.000
	L	.000	.147	.380	.000	.
N	P	187	187	187	187	187
	LC	187	187	187	187	187
	OS	187	187	187	187	187
	OC	187	187	187	187	187
	L	187	187	187	187	187

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	LC[a]	.	Enter
2	L, OS, OC[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: P

Model Summary (c)

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics				
					R^2 Change	F Change	df1	df2	Sig. F Change
1	.116(a)	.013	.008	1.675	.013	2.505	1	185	.115
2	.388(b)	.150	.132	1.567	.137	9.779	3	182	.000

a Predictors: (Constant), LC
b Predictors: (Constant), LC, L, OS, OC
c Dependent Variable: P

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.028	1	7.028	2.505	.115[a]
	Residual	518.982	185	2.805		
	Total	526.011	186			
2	Regression	79.072	4	19.768	8.050	.000[b]
	Residual	446.938	182	2.456		
	Total	526.011	186			

a. Predictors: (Constant), LC

b. Predictors: (Constant), LC, L, OS, OC

c. Dependent Variable: P

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	8.207	.636		12.906	.000		
	LC	-.027	.017	-.116	-1.583	.115	1.000	1.000
2	(Constant)	3.624	1.050		3.451	.001		
	LC	-.018	.016	-.079	-1.145	.254	.980	1.021
	OS	.005	.014	.025	.352	.725	.930	1.075
	OC	.065	.021	.241	3.146	.002	.796	1.256
	L	.080	.030	.201	2.700	.008	.843	1.187

a Dependent Variable: P

Excluded Variables (b)

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	OS	.076(a)	1.044	.298	.077	.994	1.006	.994
	OC	.322(a)	4.629	.000	.323	.991	1.009	.991
	L	.291(a)	4.143	.000	.292	.994	1.006	.994

a Predictors in the Model: (Constant), LC
b Dependent Variable: P

Collinearity Diagnostics (a)

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	LC	OS	OC	L
1	1	1.981	1.000	.01	.01			
	2	.019	10.286	.99	.99			
2	1	4.863	1.000	.00	.00	.00	.00	.00
	2	.066	8.601	.00	.01	.83	.01	.09
	3	.044	10.532	.00	.55	.03	.05	.15
	4	.018	16.220	.02	.02	.13	.61	.69
	5	.009	23.229	.97	.41	.01	.33	.06

a Dependent Variable: P

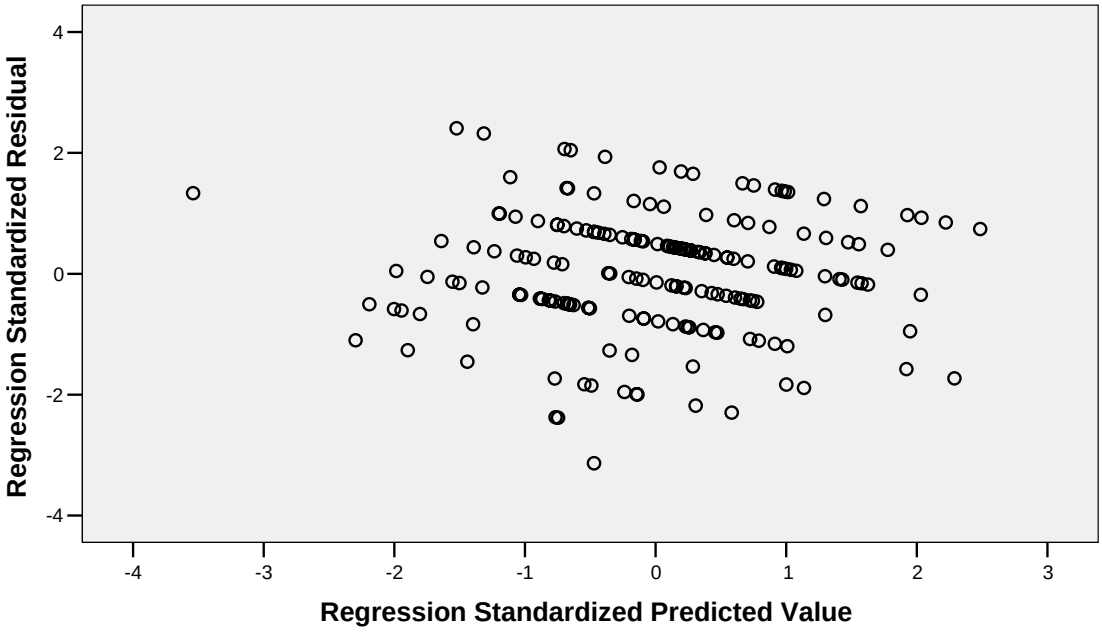
Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.91	8.84	7.22	.652	187
Residual	-4.912	3.773	.000	1.550	187
Std. Predicted Value	-3.540	2.485	.000	1.000	187
Std. Residual	-3.135	2.408	.000	.989	187

a. Dependent Variable: P

Scatterplot

Dependent Variable: P



Appendix D31: Multiple regression (ordinal variables)

Descriptive Statistics

	Mean	Std. Deviation	N
LC	37.00	7.164	200
Current operational status	3.50	1.360	200
Annual revenue	2.65	1.486	200
Number of employees	2.92	1.671	200

Correlations

		LC	Current operational status	Annual revenue	Number of employees
Pearson Correlation	LC	1.000	-.037	-.033	-.102
	Current operational status	-.037	1.000	.542	.603
	Annual revenue	-.033	.542	1.000	.646
	Number of employees	-.102	.603	.646	1.000
Sig. (1-tailed)	LC	.	.301	.321	.076
	Current operational status	.301	.	.000	.000
	Annual revenue	.321	.000	.	.000
	Number of employees	.076	.000	.000	.
N	LC	200	200	200	200
	Current operational status	200	200	200	200
	Annual revenue	200	200	200	200
	Number of employees	200	200	200	200

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Number of employees, Current operational status, Annual revenue[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: LC

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.112[a]	.013	-.003	7.173

a. Predictors: (Constant), Number of employees, Current operational status, Annual revenue

b. Dependent Variable: LC

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	128.120	3	42.707	.830	.479[a]
	Residual	10085.880	196	51.459		
	Total	10214.000	199			

a. Predictors: (Constant), Number of employees, Current operational status, Annual revenue

b. Dependent Variable: LC

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	37.755	1.423		26.528	.000		
	Current operational status	.137	.484	.026	.284	.777	.597	1.676
	Annual revenue	.236	.463	.049	.510	.610	.546	1.830
	Number of employees	-.639	.434	-.149	-1.473	.142	.493	2.030

a Dependent Variable: LC

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	Current operational status	Annual revenue	Number of employees
1	1	3.707	1.000	.01	.01	.01	.01
	2	.151	4.963	.43	.03	.18	.19
	3	.087	6.520	.01	.03	.81	.59
	4	.055	8.225	.55	.94	.00	.22

a. Dependent Variable: LC

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	34.81	38.48	37.00	.802	200
Residual	-28.196	20.517	.000	7.119	200
Std. Predicted Value	-2.732	1.848	.000	1.000	200
Std. Residual	-3.931	2.860	.000	.992	200

a. Dependent Variable: LC

Appendix D32: Multiple regression (combining ordinal variables of annual revenue and number of employees into firm size)

Descriptive Statistics

	Mean	Std. Deviation	N
LC	37.00	7.164	200
Current operational status	3.50	1.360	200
Firm size	2.783	1.4324	200

Correlations

		LC	Current operational status	Firm size
Pearson Correlation	LC	1.000	-.037	-.076
	Current operational status	-.037	1.000	.633
	Firm size	-.076	.633	1.000
Sig. (1-tailed)	LC	.	.301	.141
	Current operational status	.301	.	.000
	Firm size	.141	.000	.
N	LC	200	200	200
	Current operational status	200	200	200
	Firm size	200	200	200

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Firm size, Current operational status[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: LC

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.078[a]	.006	-.004	7.179

a. Predictors: (Constant), Firm size, Current operational status

b. Dependent Variable: LC

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61.740	2	30.870	.599	.550[a]
	Residual	10152.260	197	51.534		
	Total	10214.000	199			

a. Predictors: (Constant), Firm size, Current operational status

b. Dependent Variable: LC

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	37.883	1.420		26.683	.000		
	Current operational status	.098	.483	.019	.204	.839	.600	1.668
	Firm size	-.441	.459	-.088	-.962	.337	.600	1.668

a Dependent Variable: LC

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	Current operational status	Firm size
1	1	2.837	1.000	.01	.01	.01
	2	.110	5.069	.59	.00	.56
	3	.052	7.377	.40	.99	.43

a. Dependent Variable: LC

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	35.53	37.81	37.00	.557	200
Residual	-27.634	22.071	.000	7.143	200
Std. Predicted Value	-2.637	1.457	.000	1.000	200
Std. Residual	-3.849	3.074	.000	.995	200

a. Dependent Variable: LC

Appendix D33: Assessing normality of level of codification among six sectors

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LC	205	93.6%	14	6.4%	219	100.0%

Descriptives

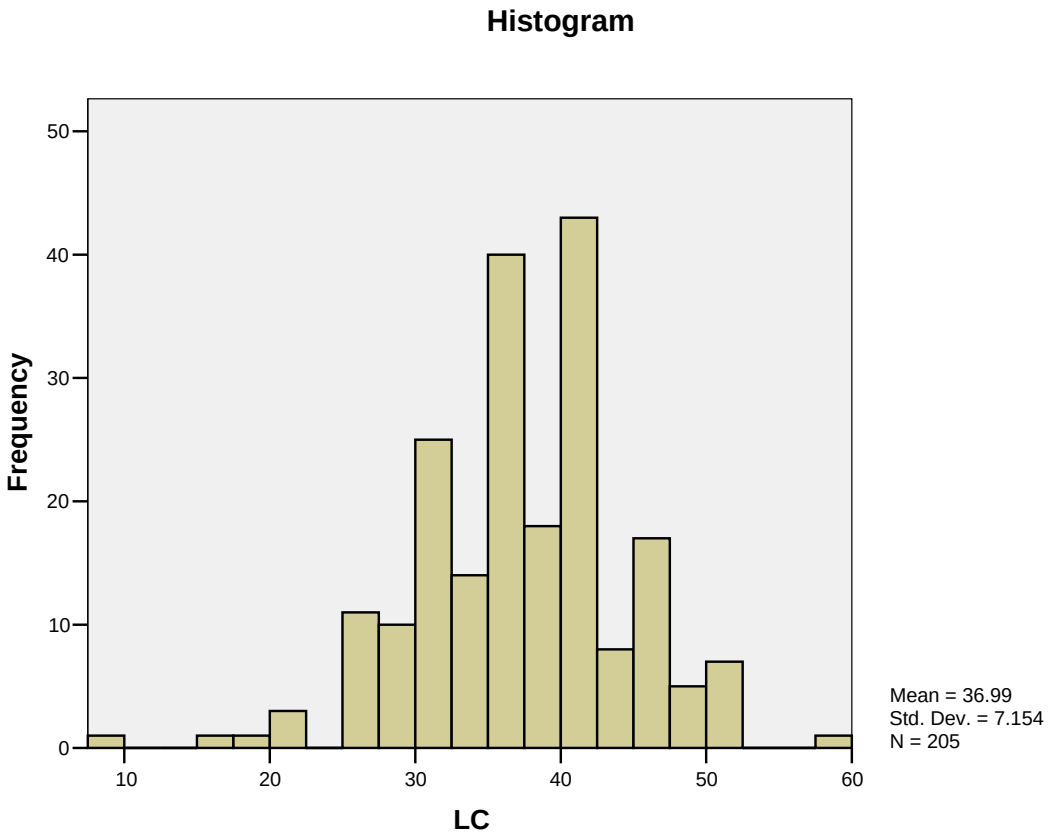
			Statistic	Std. Error
LC	Mean		36.99	.500
	95% Confidence Interval for Mean	Lower Bound	36.01	
		Upper Bound	37.98	
	5% Trimmed Mean		37.08	
	Median		37.00	
	Variance		51.176	
	Std. Deviation		7.154	
	Minimum		9	
	Maximum		59	
	Range		50	
	Interquartile Range		9	
	Skewness		-.305	.170
	Kurtosis		.976	.338

Extreme Values

			Case Number	Value
LC	Highest	1	111	*
		2	99	*
		3	184	*
		4	47	*
		5	131	*[a]
	Lowest	1	213	9
		2	73	*
		3	62	*
		4	130	*
		5	137	*[b]

a. Only a partial list of cases with the value * are shown in the table of upper extremes.

b. Only a partial list of cases with the value * are shown in the table of lower extremes.

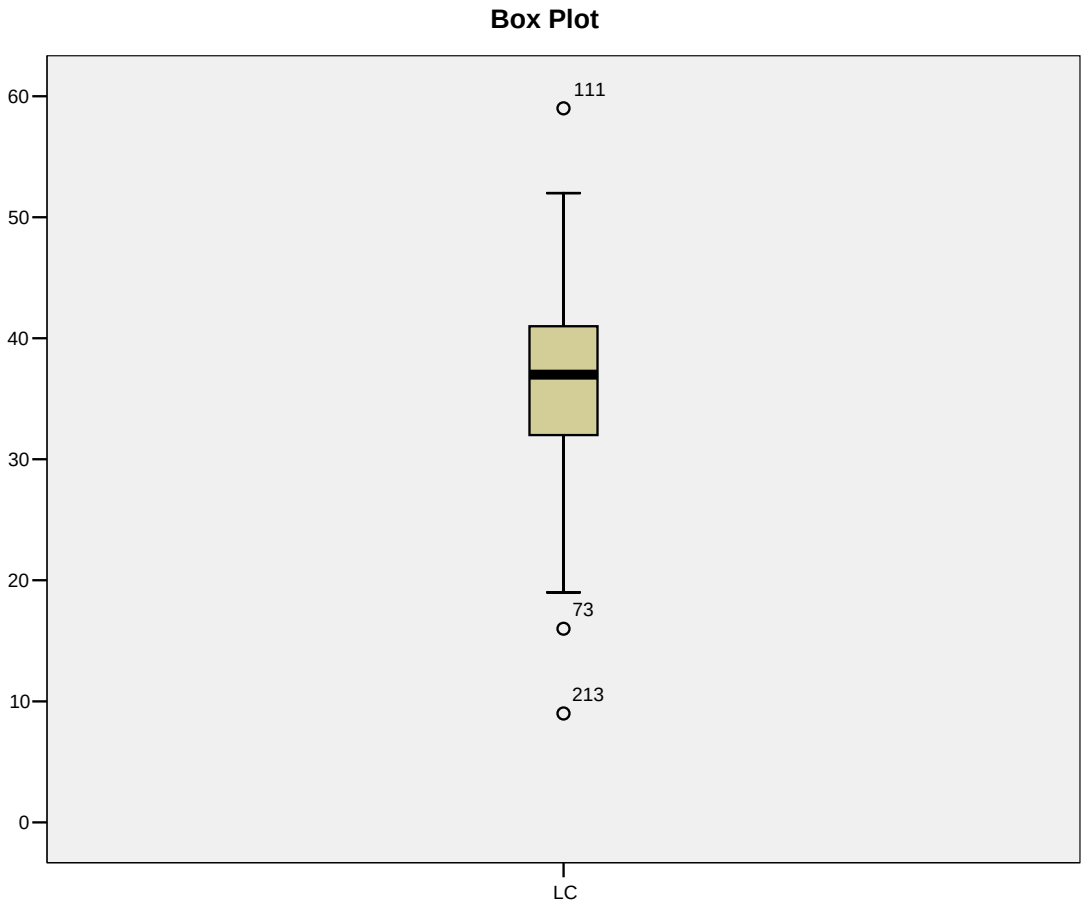


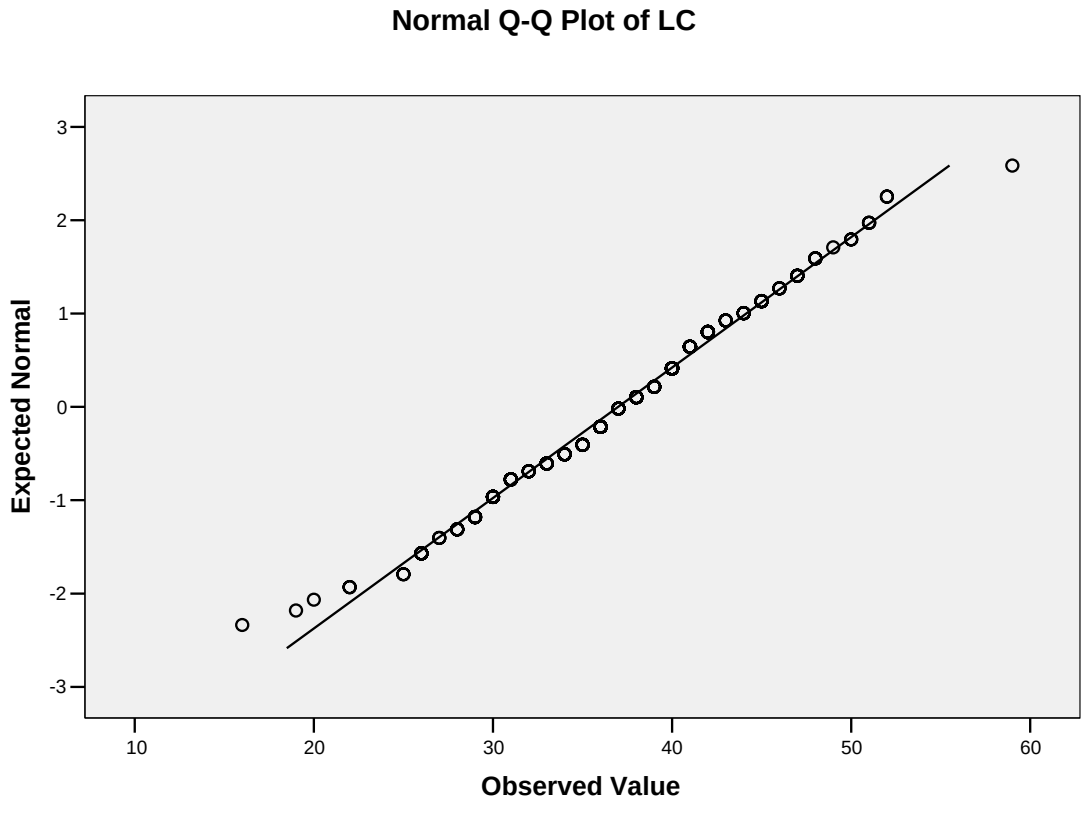
LC Stem-and-Leaf Plot

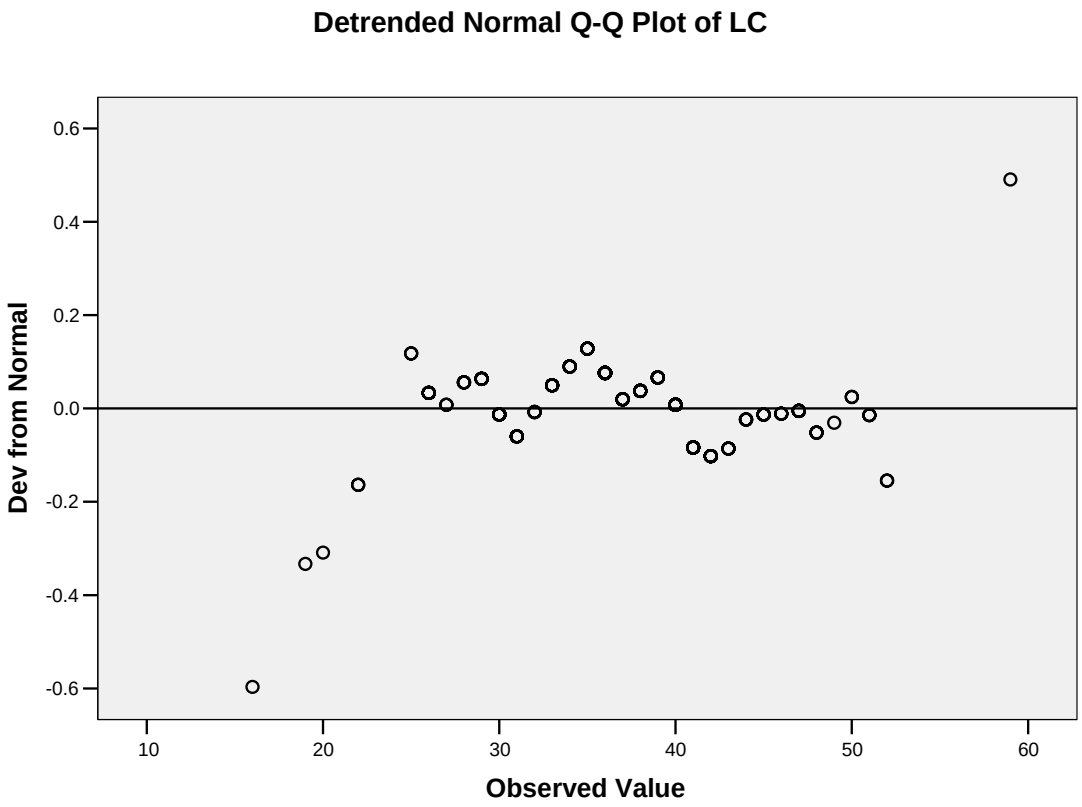
Frequency		Stem &	Leaf
2.00	Extremes		(=<16)
1.00		1 .	&
3.00		2 .	2&
21.00		2 .	5666788999
39.00		3 .	000000011122333444
58.00		3 .	55556666666666677777888889999
51.00		4 .	000000000011111222223344
22.00		4 .	5555677788&
7.00		5 .	012
1.00	Extremes		(>=59)

Stem width: *
Each leaf: 2 case(s)

& denotes fractional leaves.


Box Plot
60
50
40
30
20
10
0
111
73
213
LC


Normal Q-Q Plot of LC
Expected Normal
3
2
1
0
-1
-2
-3
10
20
30
40
50
60
Observed Value



Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
LC	.084	205	.001	.986	205	.036

a. Lilliefors Significance Correction

Appendix D34: Kruskal-Wallis test for level of codification among six sectors

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
LC	205	36.99	7.154	9	59
Sector	214	3.03	1.553	1	6

Ranks

	Sector	N	Mean Rank
LC	Creative multimedia	15	57.20
	Software development	90	104.44
	Support services	39	96.50
	Hardware design	14	102.04
	Internet based business	14	117.64
	Shared services & outsourcing	28	107.25
	Total	200	

Test Statistics[a,b]

	LC
Chi-Square	10.660
df	5
Asymp. Sig.	.059

a. Kruskal Wallis Test

b. Grouping Variable: Sector

Appendix D35: ANOVA for level of codification among six sectors

Descriptives

LC

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Creative multimedia	15	30.73	10.082	2.603	25.15	36.32	9	52
Software development	90	37.53	6.168	.650	36.24	38.83	22	52
Support services	39	36.44	7.166	1.148	34.11	38.76	19	51
Hardware design	14	38.07	9.261	2.475	32.72	43.42	26	59
Internet based business	14	39.43	6.501	1.737	35.67	43.18	30	51
Shared services & outsourcing	28	37.57	6.477	1.224	35.06	40.08	25	48
Total	200	36.99	7.192	.509	35.98	37.99	9	59

Test of Homogeneity of Variances

LC

Levene Statistic	df1	df2	Sig.
1.348	5	194	.246

ANOVA

LC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	734.818	5	146.964	2.983	.013
Within Groups	9558.137	194	49.269		
Total	10292.955	199			

Multiple Comparisons

Dependent Variable: LC

Tukey HSD

(I) Sector	(J) Sector	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Creative multimedia	Software development	-6.800*	1.958	.008	-12.43	-1.17
	Support services	-5.703	2.133	.085	-11.84	.44
	Hardware design	-7.338	2.608	.060	-14.85	.17
	Internet based business	-8.695*	2.608	.013	-16.20	-1.19
	Shared services & outsourcing	-6.838*	2.246	.031	-13.30	-.37
Software development	Creative multimedia	6.800*	1.958	.008	1.17	12.43
	Support services	1.097	1.346	.964	-2.78	4.97
	Hardware design	-.538	2.017	1.000	-6.34	5.27
	Internet based business	-1.895	2.017	.936	-7.70	3.91
	Shared services & outsourcing	-.038	1.519	1.000	-4.41	4.33
Support services	Creative multimedia	5.703	2.133	.085	-.44	11.84
	Software development	-1.097	1.346	.964	-4.97	2.78
	Hardware design	-1.636	2.187	.976	-7.93	4.66
	Internet based business	-2.993	2.187	.746	-9.29	3.30
	Shared services & outsourcing	-1.136	1.739	.987	-6.14	3.87
Hardware design	Creative multimedia	7.338	2.608	.060	-.17	14.85
	Software development	.538	2.017	1.000	-5.27	6.34
	Support services	1.636	2.187	.976	-4.66	7.93
	Internet based business	-1.357	2.653	.996	-8.99	6.28
	Shared services & outsourcing	.500	2.298	1.000	-6.11	7.11
Internet based business	Creative multimedia	8.695*	2.608	.013	1.19	16.20
	Software development	1.895	2.017	.936	-3.91	7.70
	Support services	2.993	2.187	.746	-3.30	9.29
	Hardware design	1.357	2.653	.996	-6.28	8.99
	Shared services & outsourcing	1.857	2.298	.966	-4.76	8.47
Shared services & outsourcing	Creative multimedia	6.838*	2.246	.031	.37	13.30
	Software development	.038	1.519	1.000	-4.33	4.41
	Support services	1.136	1.739	.987	-3.87	6.14
	Hardware design	-.500	2.298	1.000	-7.11	6.11
	Internet based business	-1.857	2.298	.966	-8.47	4.76

*. The mean difference is significant at the .05 level.

LC

Tukey HSD[a,b]

Sector	N	Subset for alpha = .05	
		1	2
Creative multimedia	15	30.73	
Support services	39	36.44	36.44
Software development	90		37.53
Shared services & outsourcing	28		37.57
Hardware design	14		38.07
Internet based business	14		39.43
Sig.		.090	.733

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 21.277.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

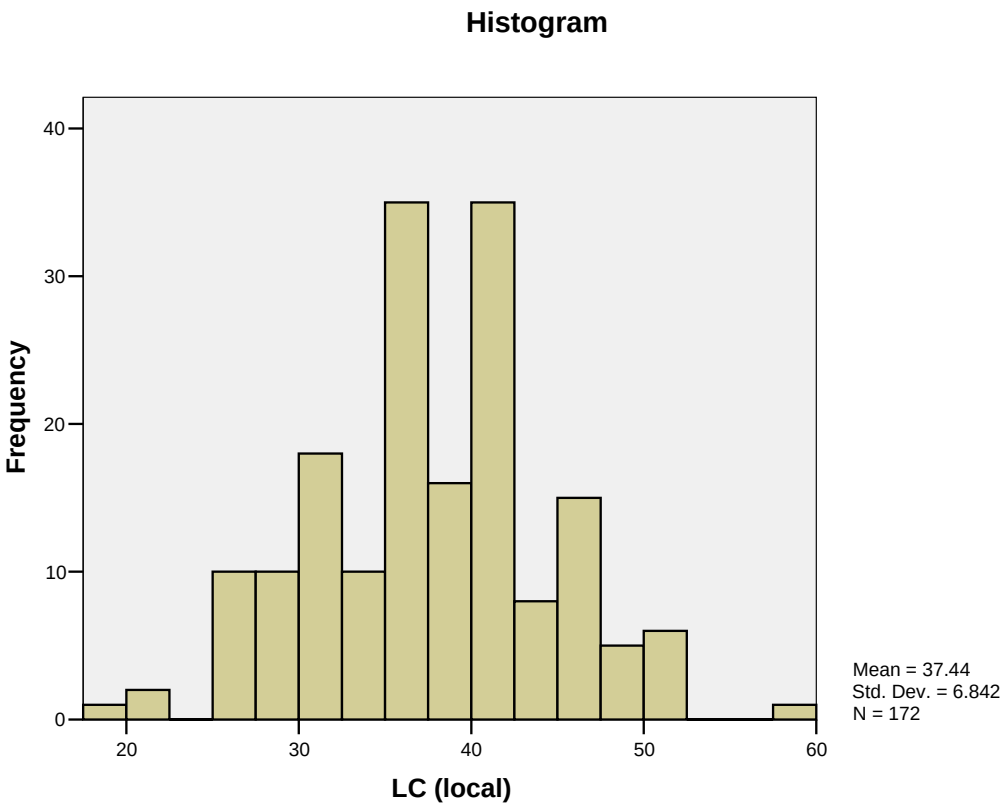
Appendix D36: Assessing normality of level of codification between local- and foreign-owned companies

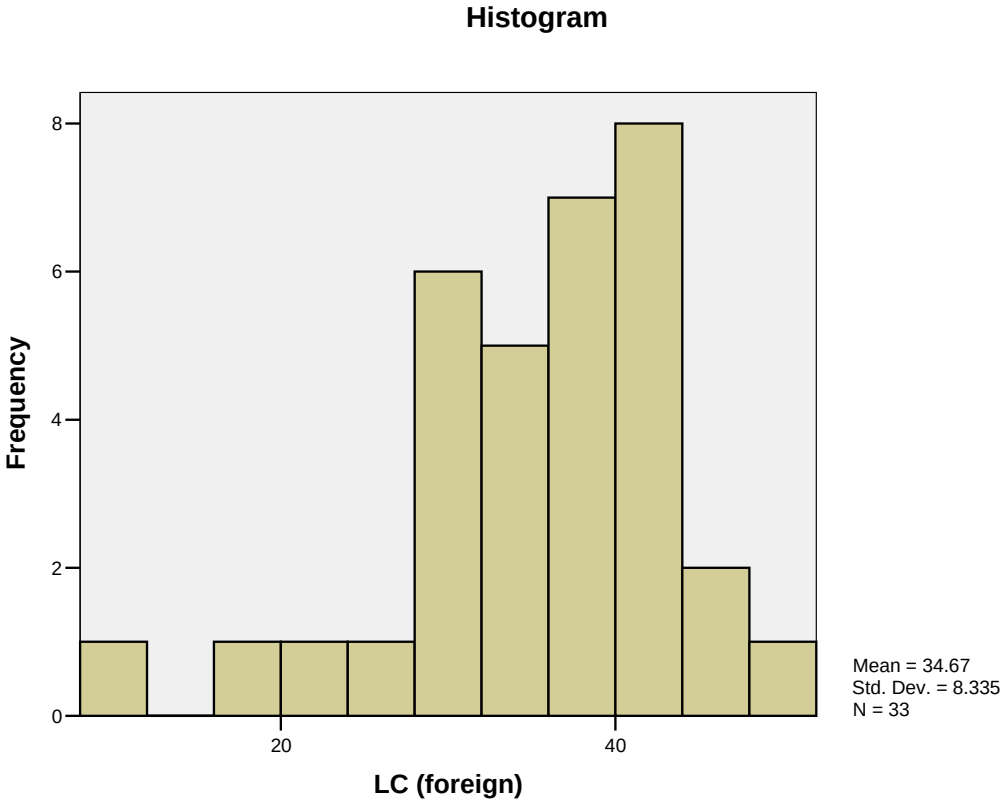
Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LC (local)	172	78.5%	47	21.5%	219	100.0%
LC (foreign)	33	15.1%	186	84.9%	219	100.0%

Descriptives

			Statistic	Std. Error
LC (local)	Mean		37.44	.522
	95% Confidence Interval for Mean	Lower Bound	36.41	
		Upper Bound	38.47	
	5% Trimmed Mean		37.41	
	Median		37.50	
	Variance		46.809	
	Std. Deviation		6.842	
	Minimum		19	
	Maximum		59	
	Range		40	
	Interquartile Range		9	
	Skewness		.005	.185
	Kurtosis		.081	.368
LC (foreign)	Mean		34.67	1.451
	95% Confidence Interval for Mean	Lower Bound	31.71	
		Upper Bound	37.62	
	5% Trimmed Mean		35.12	
	Median		36.00	
	Variance		69.479	
	Std. Deviation		8.335	
	Minimum		9	
	Maximum		51	
	Range		42	
	Interquartile Range		10	
	Skewness		-1.010	.409
	Kurtosis		2.205	.798



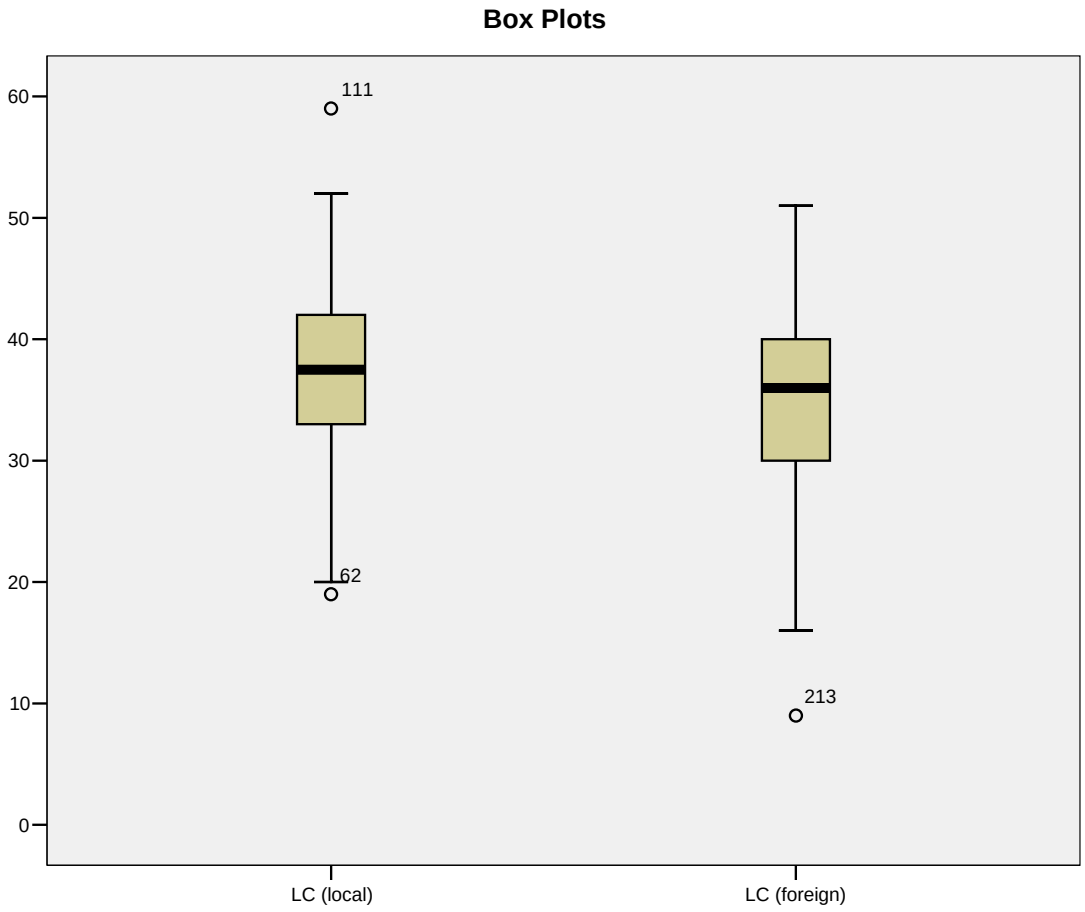


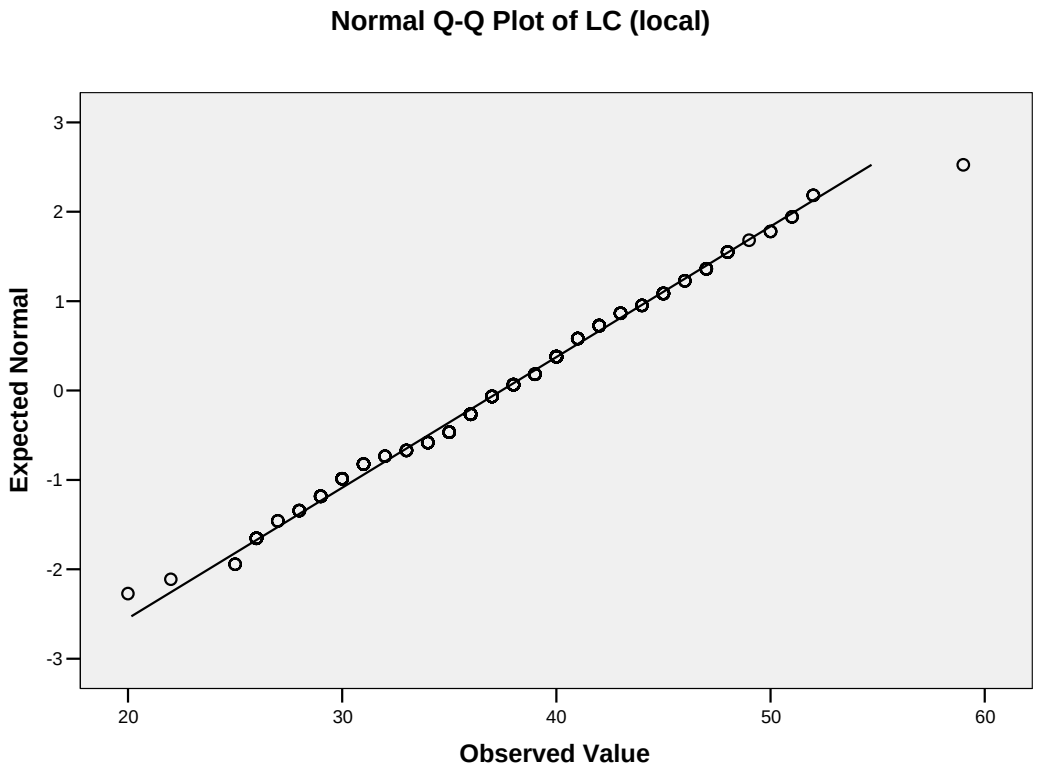
LC (local) Stem-and-Leaf Plot

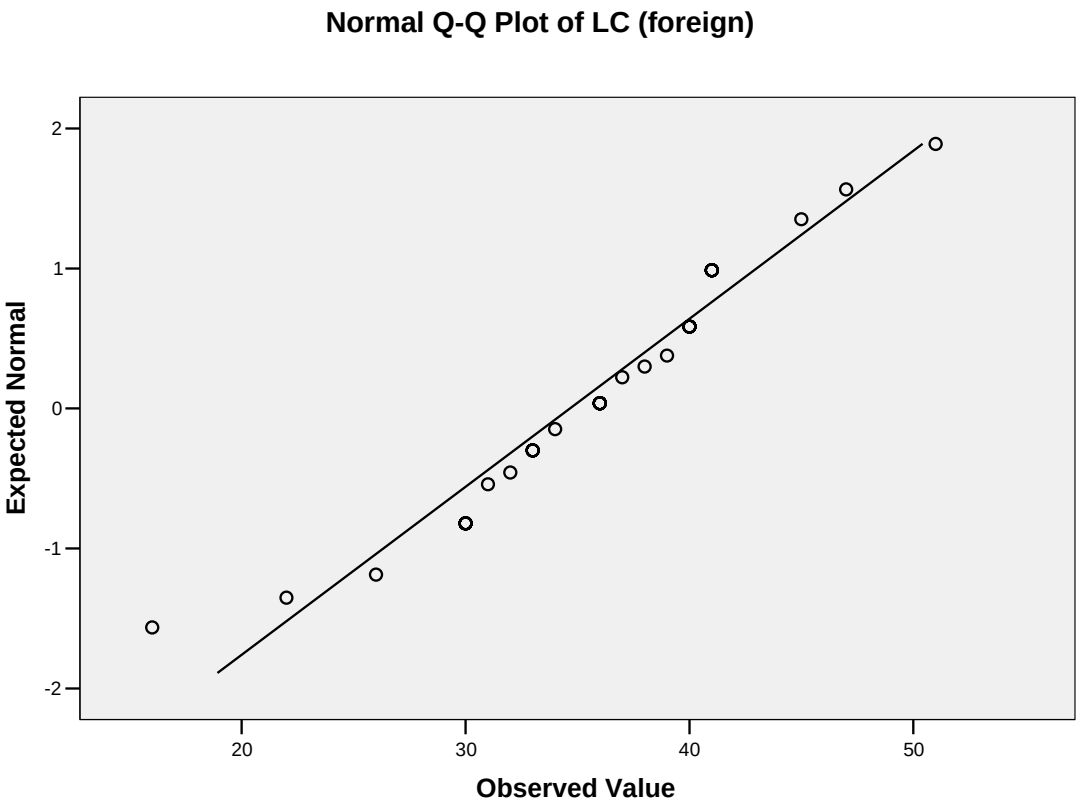
```
 Frequency    Stem &  Leaf

     1.00 Extremes    (=<19)
     1.00        2 .  0
     1.00        2 .  2
     2.00        2 .  55
     8.00        2 .  66666677
    10.00        2 .  8888999999
    15.00        3 .  000000000111111
     7.00        3 .  2223333
    14.00        3 .  44444455555555
    27.00        3 .  666666666666666666777777777
    16.00        3 .  8888888889999999
    25.00        4 .  0000000000000000000111111
    14.00        4 .  22222222223333
    11.00        4 .  44445555555
     8.00        4 .  66677777
     5.00        4 .  88889
     4.00        5 .  0011
     2.00        5 .  22
     1.00 Extremes    (>=59)

 Stem width:  *
 Each leaf:       1 case(s)
```

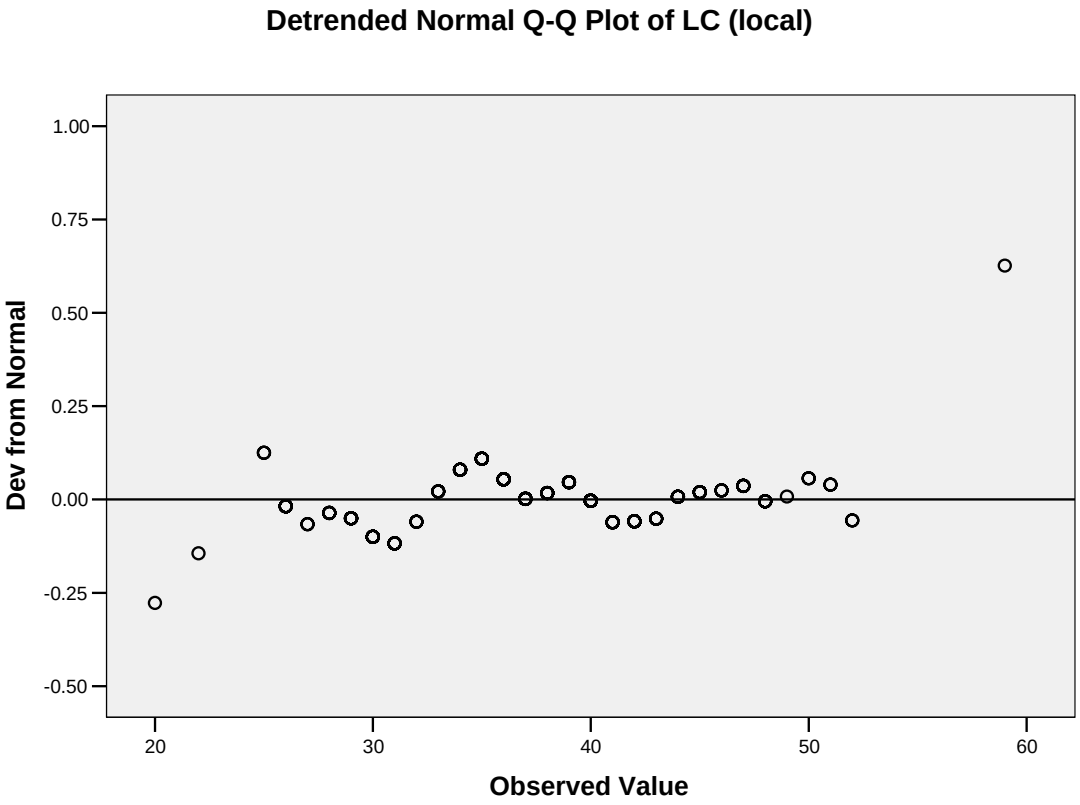
LC (foreign) Stem-and-Leaf Plot

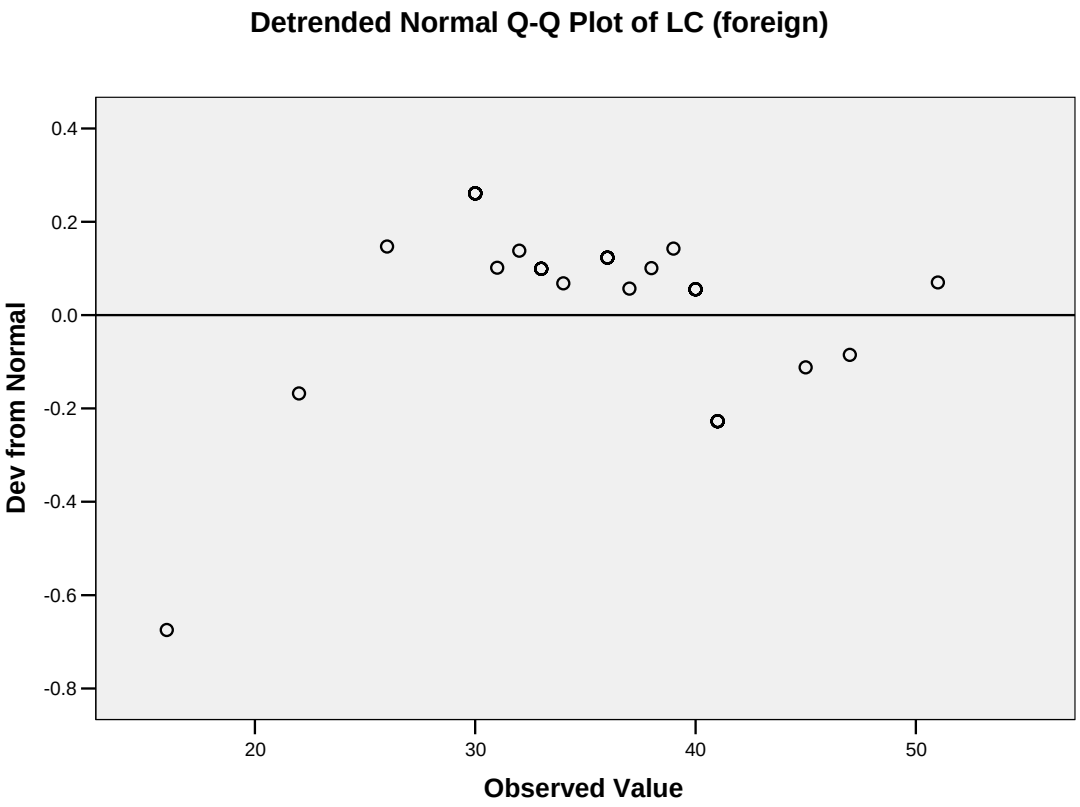
```
 Frequency    Stem &  Leaf

     1.00 Extremes    (=<9)
     1.00        1 .  6
     1.00        2 .  2
     1.00        2 .  6
    11.00        3 .  00000123334
     7.00        3 .  6666789
     8.00        4 .  00001111
     2.00        4 .  57
     1.00        5 .  1

 Stem width:  *
 Each leaf:       1 case(s)
```


Box Plots
60
50
40
30
20
10
0
111
62
213
LC (local)
LC (foreign)


Normal Q-Q Plot of LC (local)
Expected Normal
3
2
1
0
-1
-2
-3
20
30
40
50
60
Observed Value


Normal Q-Q Plot of LC (foreign)
Expected Normal
Observed Value
2
1
0
-1
-2
20
30
40
50


Detrended Normal Q-Q Plot of LC (local)
Dev from Normal
Observed Value
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
20
30
40
50
60



Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
LC (local)	.074	172	.023	.993	172	.526
LC (foreign)	.167	33	.021	.929	33	.033

a. Lilliefors Significance Correction

Appendix D37: Mann-Whitney U test for level of codification between local- and foreign-owned companies

Ranks

Major equity ownership		N	Mean Rank	Sum of Ranks
Knowledge management strategy	Local	172	105.48	18142.50
	Foreign	33	90.08	2972.50
	Total	205		

Test Statistics[a]

	Knowledge management generic strategy
Mann-Whitney U	2411.500
Wilcoxon W	2972.500
Z	-1.950
Asymp. Sig. (2-tailed)	.051

a. Grouping Variable: Major equity ownership

Appendix D38: t-test for level of codification between local- and foreign-owned companies

Group Statistics

	Major equity ownership	N	Mean	Std. Deviation	Std. Error Mean
LC	Local	172	37.44	6.842	.522
	Foreign	33	34.67	8.335	1.451

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
LC	Equal variances assumed	.753	.386	2.053	203	.041	2.769	1.349	.110	5.429
	Equal variances not assumed			1.796	40.68	.080	2.769	1.542	-.345	5.884

Appendix D39: Assessing normality of performance between personalization-codification and hybrid strategies

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
PPC	39	17.8%	180	82.2%	219	100.0%
PHY	155	70.8%	64	29.2%	219	100.0%

Descriptives

			Statistic	Std. Error
PPC	Mean		6.87	.244
	95% Confidence Interval for Mean	Lower Bound	6.38	
		Upper Bound	7.37	
	5% Trimmed Mean		6.88	
	Median		7.00	
	Variance		2.325	
	Std. Deviation		1.525	
	Minimum		4	
	Maximum		10	
	Range		6	
	Interquartile Range		2	
	Skewness		-.242	.378
	Kurtosis		-.423	.741
PHY	Mean		7.29	.136
	95% Confidence Interval for Mean	Lower Bound	7.02	
		Upper Bound	7.56	
	5% Trimmed Mean		7.35	
	Median		8.00	
	Variance		2.870	
	Std. Deviation		1.694	
	Minimum		2	
	Maximum		10	
	Range		8	
	Interquartile Range		2	
	Skewness		-.376	.195
	Kurtosis		.021	.387

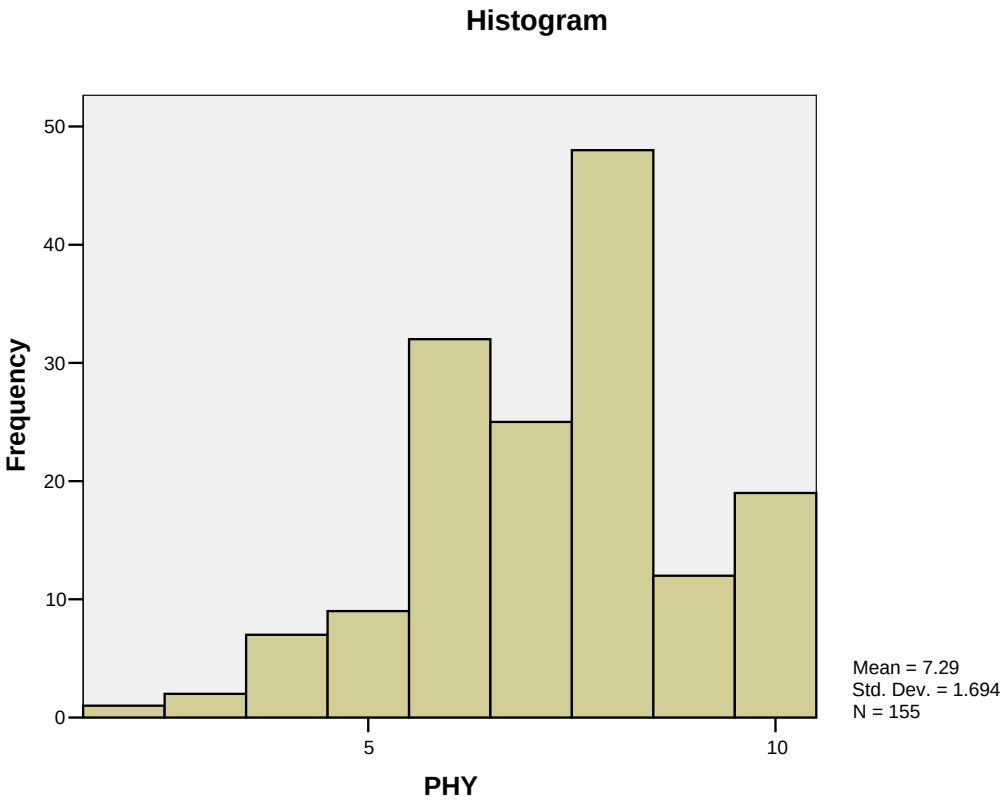
Extreme Values

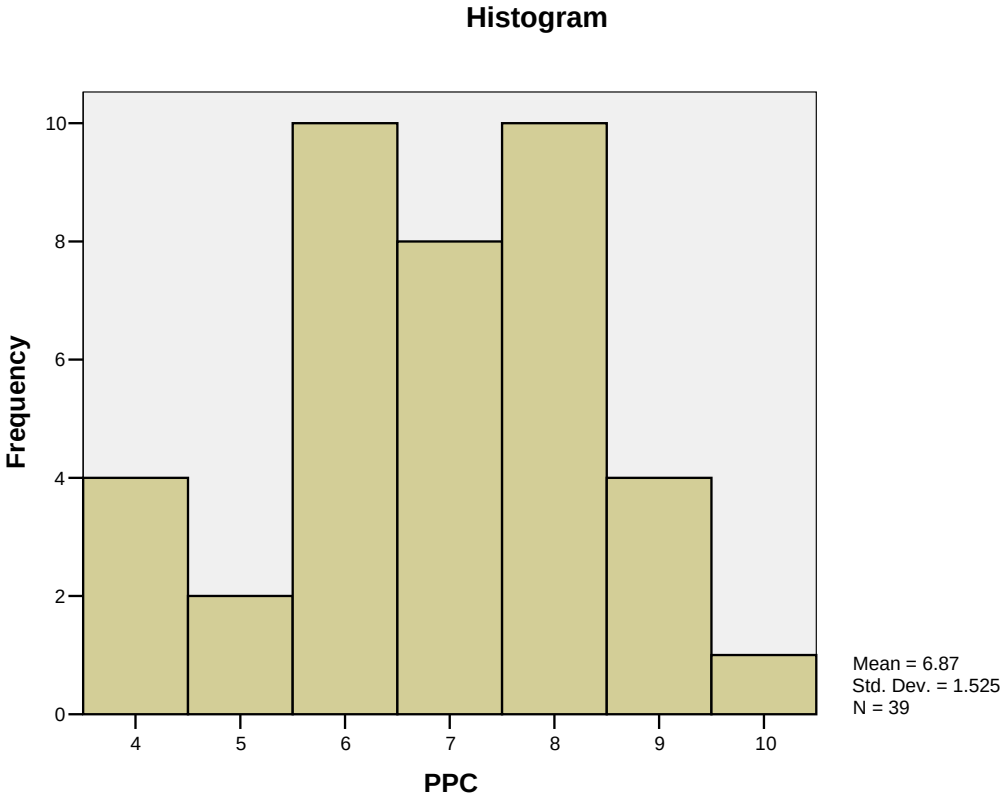
			Case Number	Value
PPC	Highest	1	130	10
		2	23	9
		3	62	9
		4	99	9
		5	207	9
	Lowest	1	180	4
		2	80	4
		3	13	4
		4	6	4
		5	77	5[a]
PHY	Highest	1	9	10
		2	58	10
		3	60	10
		4	61	10
		5	67	10[b]
	Lowest	1	189	2
		2	160	3
		3	113	3
		4	200	4
		5	174	4[c]

a. Only a partial list of cases with the value 5 are shown in the table of lower extremes.

b. Only a partial list of cases with the value 10 are shown in the table of upper extremes.

c. Only a partial list of cases with the value 4 are shown in the table of lower extremes.

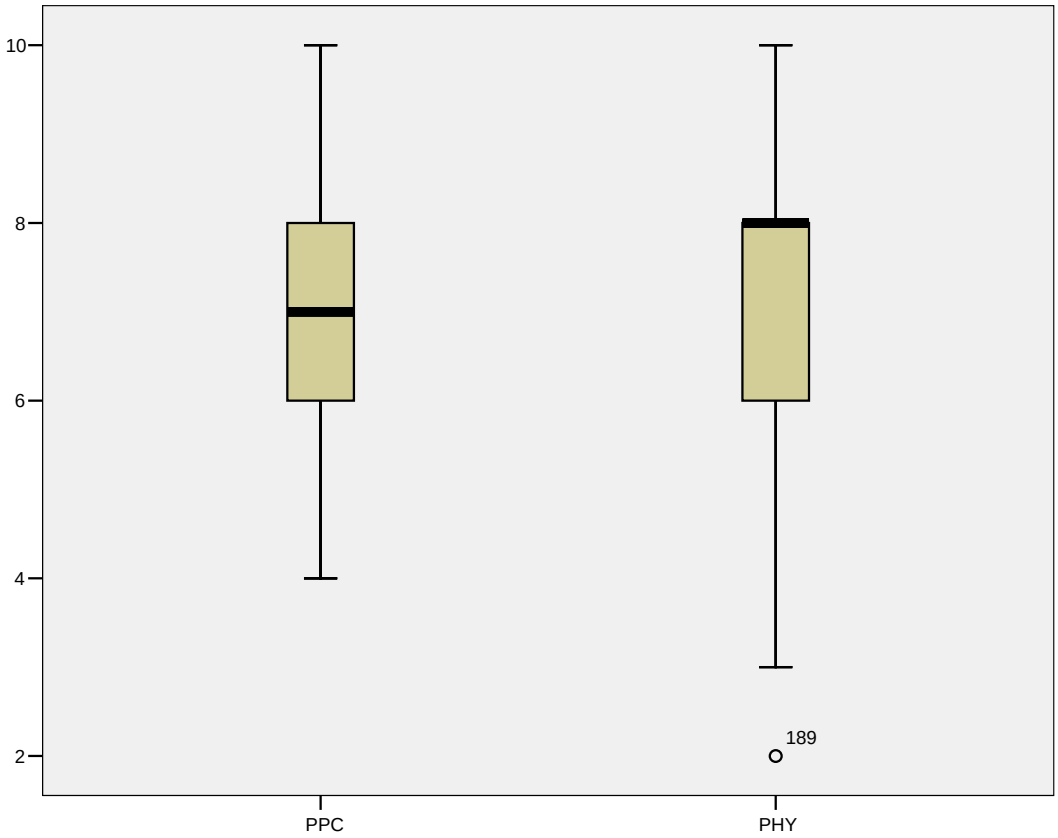

Histogram
Frequency
50
40
30
20
10
0
5
10
PHY
Mean = 7.29
Std. Dev. = 1.694
N = 155


Histogram
Frequency
10
8
6
4
2
0
4
5
6
7
8
9
10
PPC
Mean = 6.87
Std. Dev. = 1.525
N = 39

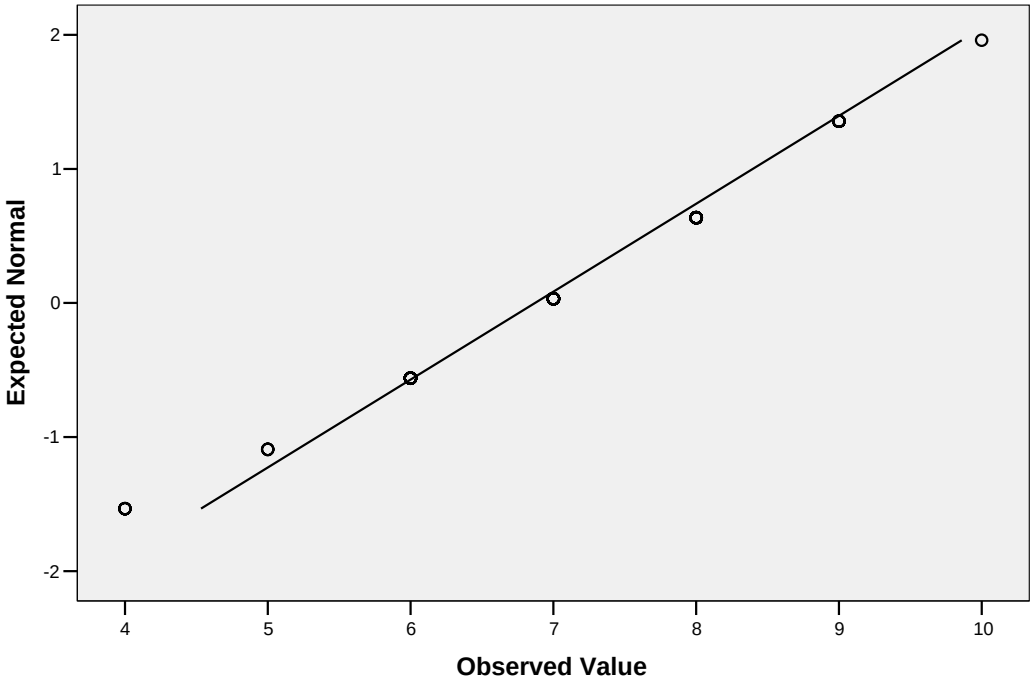
```
 PPC Stem-and-Leaf Plot
 Frequency    Stem &  Leaf

     4.00        4 .  0000
      .00        4 .
     2.00        5 .  00
      .00        5 .
    10.00        6 .  0000000000
      .00        6 .
     8.00        7 .  00000000
      .00        7 .
    10.00        8 .  0000000000
      .00        8 .
     4.00        9 .  0000
      .00        9 .
     1.00       10 .  0

 Stem width:   1
 Each leaf:       1 case(s)
```

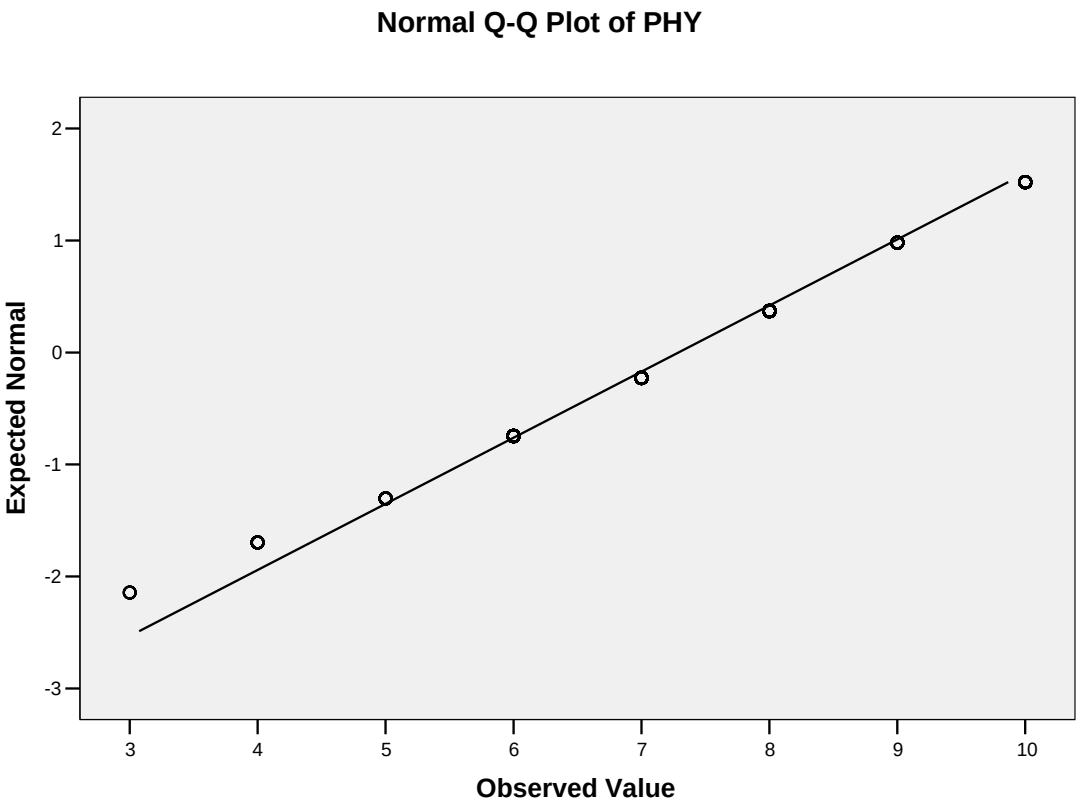
```
PHY Stem-and-Leaf Plot

 Frequency    Stem &  Leaf

     3.00 Extremes    (=<3.0)
     7.00        4 .  0000000
      .00        4 .
     9.00        5 .  000000000
      .00        5 .
    32.00        6 .  00000000000000000000000000000000
      .00        6 .
    25.00        7 .  0000000000000000000000000
      .00        7 .
    48.00        8 .  000000000000000000000000000000000000000000000000
      .00        8 .
    12.00        9 .  000000000000
      .00        9 .
    19.00       10 .  0000000000000000000

 Stem width:   1
 Each leaf:       1 case(s)
```

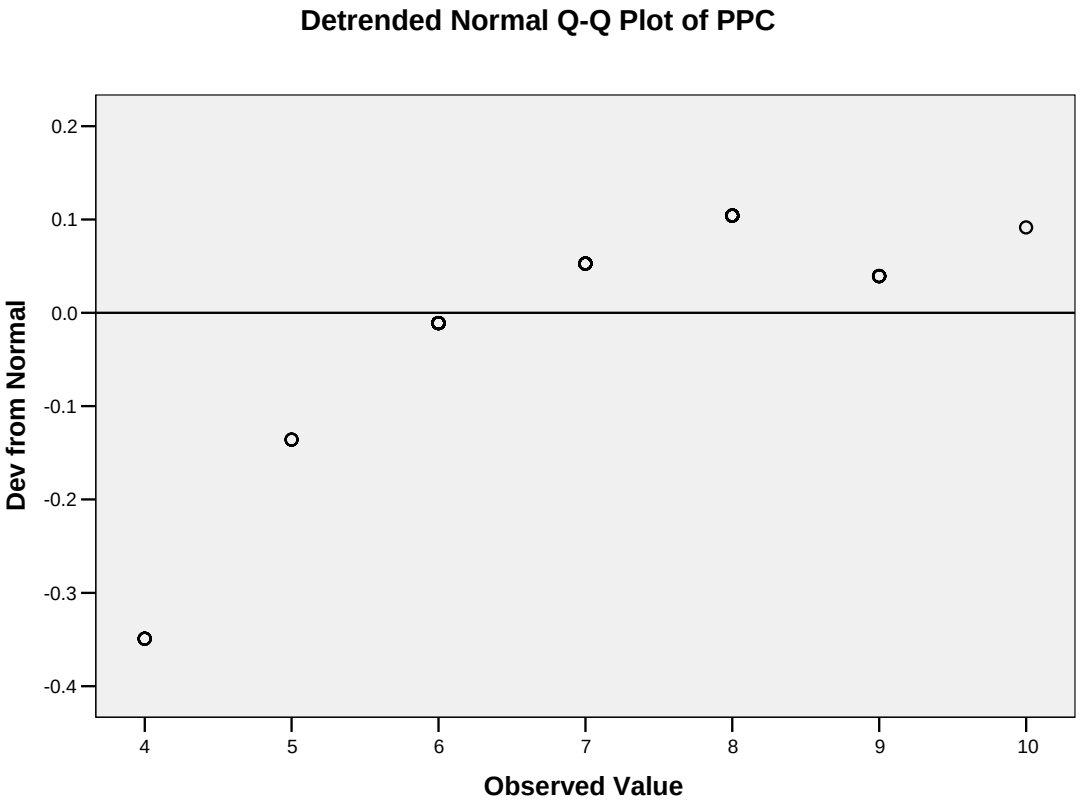
Box Plots

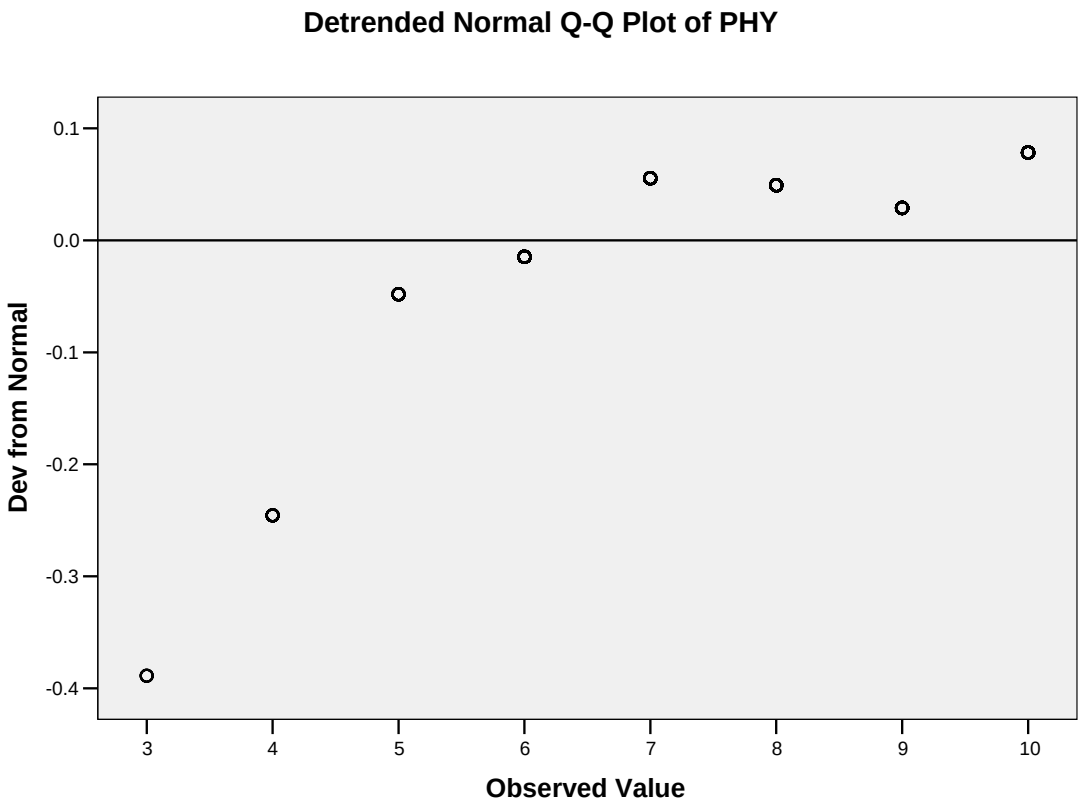


Normal Q-Q Plot of PPC




Normal Q-Q Plot of PHY
Expected Normal
Observed Value
2
1
0
-1
-2
-3
3
4
5
6
7
8
9
10


Detrended Normal Q-Q Plot of PPC
Dev from Normal
Observed Value
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
4
5
6
7
8
9
10



Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PPC	.155	39	.019	.940	39	.039
PHY	.172	155	.000	.941	155	.000

a. Lilliefors Significance Correction

Appendix D40: Mann-Whitney U test for performance between personalization-codification and hybrid strategies

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
P	207	7.17	1.642	2	10
KMS	205	4.25	4.451	2	13

Ranks

	KMS	N	Mean Rank	Sum of Ranks
P	1	39	86.12	3358.50
	2	155	100.36	15556.50
	Total	194		

Test Statistics[a]

	P
Mann-Whitney U	2578.500
Wilcoxon W	3358.500
Z	-1.449
Asymp. Sig. (2-tailed)	.147

a. Grouping Variable: KMS

Appendix D41: t-test for performance between personalization-codification and hybrid strategies

Group Statistics

	KMS	N	Mean	Std. Deviation	Std. Error Mean
P	1	39	6.87	1.525	.244
	2	155	7.29	1.694	.136

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
P	Equal variances assumed	.651	.421	1.406	192	.161	.419	.298	-.169	1.006
	Equal variances not assumed			1.497	63.748	.139	.419	.280	-.140	.977