De Theatro Motivarum, Motivation: In Search of Essentials. Research on a Theoretical Model of the Process of Motivation and on Critical Determinants of Interference

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Chapter 5
Empirical Research
The Process of Motivation

5.1. Introduction

A Model of Motivation was introduced that appeared to be embedded in a large array of theories and empirical findings produced in literature.

In the Model presented, it was assumed that every Process of Motivation evolves around an objective and proceeds in a number of distinct, consecutive steps or so-called 'Stages' that can be organized in groups or 'Phases'. The Process of Motivation was an intentional, oriented activity aimed at reaching and fulfilling the objective set. Human Motivation, in short, was perceived of as an 'inner dialogue', a stepwise, sequential Process, where the Individual attempts to reach and secure the objective, seeking a balance within the constraints of his mental or physical surroundings.

Chapter 5, is to provide descriptive evidence of assumed essentials within this Process of Motivation.

The objective of the Chapter was summarized in the Problem Statement, Chapter 2.5.:

- *This dissertation aims, as its primary objective, at providing insights into the Process of Motivation, by means of:*
    - *a theoretical Model, provided in a summarized overview Chapter 3,*
    - *an embedment in current literature, provided by an annotated overview of principal findings in Chapter 4,*
    - *with the present Chapter to contain empirical research providing evidence of the elementary constructs from the Model, in terms of components and their respective items, capturing the Process of Motivation,*

      thus providing empirical evidence in support of the Model.

5.2. Application of the Model of Motivation

At the basis of an empirical validation in Chapter 5, are the Pre-Fundamental Assumptions defined Chapter 1.5., where a reintroduction of inductive inference in the generation of theoretical Models is suggested. A demarcation between theory-formation and definition of hypotheses is to differentiate inductive generalizations from empirically tested deductive findings.

Essential in the Model is that it provides an explanatory context from which elementary hypotheses, critical to the Model, can be derived. In concluding the overview, Chapter 3.3.4. identified Phases of Internally Evoked Self-Assessment and Dedication, as Phases essential to the Model of Motivation. Both constructs, then, are to be elementary in the formulation of those hypotheses.

The empirical research, in its essence, is to either verify if both Phases can be identified as elementary in a data-set, or aim at a statistical reduction of a data-set leading to an identification of both Phases. A choice for data-reduction is made. The approach is reflected in a definition of hypotheses provided in Chapter 5.4.3.

To perform the data-reduction a quantification of the Model of Motivation and its distinct elements is made.

A brief overview of the operationalization precedes a description of the research design.

5.3. Operationalization

Given the theoretical Model of Motivation provided in Chapter 3, an operationalization of distinct elements from the Model is obtained by means of a questionnaire, capturing each Stage with a number of questions, clustered according to their distinct Phases, thus covering all aspects of the Model.

A specifically designed questionnaire is introduced, the 'Human Factor Inventory', designated as 'HF-2.01' [1].

In presenting the HF-2.01 questionnaire it is to be emphasized, however, that in this dissertation the objective has been to capture distinct elements from the Model, not to design a measurement instrument[2] [3].

[1] In the naming of the questionnaire the term 'Motivation' was left out intentionally and a neutral designation 'Human Factor Inventory' was used to avoid a potential bias amongst respondents filling out the survey.

[2] As referred to in the Preamble the focus of this dissertation is mainly theoretical and aimed at a verification of an assumed conceptualization of the Process of Motivation. However, the research Project, referred to in Mennes (2016, *in press*) on which this dissertation is based, has a more practical focus, capturing elements within Motivation to quantify and test the effects of managerial techniques in addressing Motivation. From this perspective, the approach aimed at quantification in the research Project could be perceived of as a first step towards a design of a measurement instrument.

[3] In addition to these observations on design of a measurement instrument, further steps are to focus on the assessment of various psychometric characteristics, in terms of reliability and validity. A number of preliminary observations have been made in Mennes (2016, *in press*), notably Chapter (Continued)

The questionnaire covers a total of 93 questions, with a set of additional descriptive questions aimed at specific sampling populations. For a full overview, reference is made to Appendix III, where the questionnaire is presented both in its original version in Section A., and with distinct items clustered according to the 8 respective Phases of the Model, in Section B, with letter-coded indications, and the Likert-scales used per item. For reasons of brevity, items contained in Section B. are presented in a condensed phrasing, and explanatory texts included in the original questionnaire have been omitted.

A background rationale for the clustering of items is included in Appendix III, Section B. For an overview on the format of the questionnaire and on phrasing and scaling of questions, reference is made to Mennes (2016, *in press*), notably Chapter 5.3.

5.4. Research Design

The HF-2.01 questionnaire operationalizes the various Phases of the Model of Motivation and provides a quantified data-set. Given the Problem Statement, the empirical research is aimed at tracing within this data-set, the elementary components that capture the concept of Motivation, while preserving, as much as possible, its original signature.

The design of experiment, then, is aimed at a reduction of the data-set to a series of components and to provide evidence of a match between those components and items captured according to the Phases of the Model.

Two approaches are considered: Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA). Although CFA appears to be an appropriate statistical technique to verify the factor structure of a set of observed variables (Suhr, 2006), and a comparison is made between a set of statistically derived elementary components and a set of theoretically inferred items, a preference is given to EFA. Given the Problem Statement of the dissertation to obtain elementary constructs that capture the Process of Motivation, EFA is used, rather than CFA, as the principal aim of the analysis is to explore the possible underlying structures in a set of interrelated variables without imposing any preconceived structure on the outcome (Child, 1990). Instead of postulating a relationship pattern a priori between a set of variables and underlying constructs, and testing the hypothesis that a relationship exists, as occurs in CFA (Suhr, 2006), EFA merely identifies constructs and underlying factor structures in data-sets (Stevens, 2002). Where EFA explores, CFA determines the adequacy of a model fit (Schumacker & Lomax,

14.4.2., where internal, external, construct and statistical conclusion validity issues were observed. Additional research is needed, not only to further analyze these validity issues, but also to provide comparisons with current standards in both predictive and concurrent validity analyses, or by using multiple methods, in terms of currently available surveys that are assumed to measure same entities, and to elaborate on construct validity in Multitrait-Multimethod Matrix (MTMM) analyses (Campbell & Fiske, 1959; Fiske & Campbell, 1992).

1996; Suhr, 2006; Tabachnik & Fidell, 2001)[1] [2].

Data reduction is obtained through Principal Component Analysis. In the extraction phase of the analysis, the data-set of questions obtained from the HF-2.01 questionnaire is limited to components with highest eigenvalues, designated as 'initial components', accounting for a substantial variance and thus providing an adequate description of the data-set. In a subsequent rotation phase these extracted initial components are further reduced towards components that are optimized in structure and therefore, can be considered as a reduced reflection of the original initial components. These resulting components are designated as 'elementary components', which, through rotation, have preserved their original signature.

In a subsequent step, the reduced data-set is to be compared to the Model of Motivation it is meant to represent. Two important assumptions underlie the comparison.

It is assumed, that if the resulting elementary components are an adequate representation of the Model of Motivation, these clusters will reflect the structure in alleged Phases the Model consists of. Given the Problem Statement, as defined in Chapter 2.5., a statistical reduction is to provide components that are to reflect clusters of items operationalizing elementary constructs, or the most important Phases in the Model of Motivation.

Additional comparisons are made to verify these findings, which are based on a second important assumption. The Model of Motivation claims to be universally applicable: the sequential Model capturing the Process is assumed to be the same irrespective of differences in sampling population. Thus, with a business environment as a principle sampling population as indicated in Chapter 2.4.3.3., it is assumed the Model of Motivation would provide a same set of elementary components irrespective of differences in performance, or culture, or specific company-related characteristics, within limitations set to sampling within a quasi-experimental setting[3].

If clustering is to follow the suggested theoretical classification, it is assumed justified to perform a further statistical reduction that will greatly facilitate subsequent empirical research, i.e. the reduction towards a factor score per component.

[1] Furthermore, a choice for EFA also originates from a concern briefly covered in Appendix III, Section B. In the scale development generating the initial sets of items based on the theoretical Model of Motivation the assessment of content validity was challenged. By choosing EFA an additional verification could be obtained in observing resulting clusters from the data, without pre-imposing a set of theoretically inferred items, as in CFA. For further details, reference is made to Appendix III, Section B. For an excellent coverage on the development of measures see: Hinkin, 1995, 1998; MacKenzie, Podsakoff & Podsakoff, 2011.

[2] In addition, it is noted that the number of items to be analyzed is too large to use in a CFA (Bentler & Chou, 1987).

[3] For this reason, no further analysis of culture-related characteristics is performed.

5.4.1. Statistics

In the underlying statistical analysis, then, a three-fold approach will be followed:

- A reduction in data through Exploratory Factor Analysis by means of Principal Component Analysis;
- A comparison between statistical and theoretical data matrices;
- A reduction of data to a single statistical score, by means of factor scoring.

1. Exploratory Factor Analysis

Where the objective of the study is to determine elementary underlying structures without imposing a preconceived structure on the outcome (Child, 1990), in reducing the data-set a preference is given to EFA, rather than CFA.

Reduction of the data-set is achieved by Principal Component Analysis (PCA) (Dunteman, 1989; Stevens, 2002). The PCA approach assumes the sample to be the population, thus restricting extrapolation. Generalizations can be achieved by using different samples[1].

The PCA is performed on the correlation matrix of the data-set, which makes use of a standardized approach, thus avoiding the effects of differences in measurement scales on the variables (Morrison, 1967). A number of preliminary analyses are to precede the PCA. Inter-item correlations are to be observed with no items exceeding scores of .80, indicating that no singularity in data is present, and no items occur with a majority ($\geq$ 50%) of significance values exceeding .05 (Field, 2005). In addition, a Bartlett's Test of Spherity with $p<.001$ is to exclude that variables in the correlation matrix are uncorrelated, making a PCA redundant (Cooley & Lohnes, 1971). A Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) is to be performed with scores exceeding .7 (Kaiser, 1974; Hutcheson & Sofroniou, 1999).

Relevant, initial components are generated in three steps. First, components are isolated using a standard eigenvalue cutoff of 1.0 following Kaiser's criterion (Kaiser, 1960). Second, by graphing the eigenvalues in a scree plot and selecting the number of relevant components at the inflexion of the curve (Cattell, 1966; Child, 1990, Stevens, 2002). In addition to these common criteria, a third criterion is formulated by assuming an adequate extraction is performed when an average communality is obtained of at least .60, with a sample size exceeding n=250 (Hakstian, Rogers & Cattell, 1982; Stevens, 2002).

[1] As the assumption is made that the questions operationalizing Motivation, represent the entire Process, and thus that the variables generated in the different samples constitute the entire population of variables, a Maximum-Likelihood approach could also be used (Harman, 1976). Both approaches have a tendency to generate equal results (Guadagnoli & Velicer, 1988; Stevens, 2002), and preference was given to the more commonly used PCA approach.

In a subsequent rotation, components are extracted into clusters of variables using oblique rotation, with direct oblimin, as resulting components are assumed to be correlated to some extent, given the nature of the concept of Motivation with expected high degrees of communalities (Nunnally & Bernstein, 1994). The elementary components, called for in the Problem Statement, are isolated in three steps. First, as rotation can be seen as a further reduction of initial components towards an essential underlying dimension that was previously hidden before rotation, one could consider the rotation to be a reduction of these initial components towards ingredients that represent their essential nature. Thus, initial components are reduced to elementary components revealing their underlying original signature[1]. By observing in the analysis only these initial components, the rotation is to provide the essential dimensions within these initial components. In a first step, the analysis will therefore only focus on initial components and the reductions obtained after rotation. In a second step, per component, constituting items are isolated by interpreting only factor loadings with an absolute value greater than .40 (Stevens, 1992; with additional observations Stevens, 2002)[2]. In a third and last step, an overall reliability per component is determined, with a Cronbach alpha of at least .70 (Kline, 1999)[3].

A pattern matrix is preferred to represent the outcomes to those provided by a structure matrix, given the assumed relation in components and the extraction by oblique rotation (Graham, Guthrie & Thompson, 2003), as resulting values tend to be less inflated (Tabachnik & Fidell, 1996).

All analyses are made using standard SPSS procedures (Norusis, 1990).

[1] In the analysis, the elementary components are to be further reduced to two sets of elementary components, a primary and a secondary set.

[2] In addition, various rules have been suggested for including sample size as a criterion in obtaining reliable factors. Guadagnoli and Velicer (1988) suggest, in addition to the factor loading criterion, that components with about 10 .40 factor loadings are reliable as long as sample size is greater than about 150. The observations are to be included in determining an adequate sample size in Chapter 5.4.2.

[3] In addition to these criteria, a fourth criterion could have assumed these elementary components to account for a minimal proportion of total variance. However, with direct oblimin rotation, components are assumed to be correlated to some extent. In using a nonorthogonal rotation, the rotated components share common variance. As a consequence, variance cannot be partitioned uniquely among components and a cumulative variance cannot be deduced for isolated components.

2. Comparative Analysis of Matrices

A comparative analysis is performed observing a 'fit'-'non-fit', or 'true'-'false' classification, between elementary components obtained from the PCA and a clustering of items according to the theoretical Model of Motivation.

In the comparison and evaluation of simple 2x2 matrices a problem arises in using a suitable test, as the important assumption of having expected frequencies higher than 5 (for chi-square) or even 1 (for loglinear analysis) cannot be met when a near perfect match is achieved between two sets of nominal data with a comparatively small set of matching items[1]. As a result, different measures are applied. A simple comparison in terms of relative percentages in overlap is complemented by so-called 'sensitivity' and 'specificity' indicators (Altman & Bland, 1994)[2]. Relative overlap should be $\geq$ 75%, with both sensitivity and specificity measures exceeding 75%. Both a Phi Coefficient (Φ) and a symmetric Lambda (Guttman's Coefficient of Predictability λ) are used to indicate both strength and significance in results obtained [3]. A match would be achieved with both Φ and λ significant at $p<.05$.

The proposed approach for data comparison will also be applied in a comparison of data obtained from various sub-samples, as defined in Chapter 5.4.2.

[1] In these instances, an expected frequency is dramatically reduced for a small 'true-true' cell, in comparison to a dramatically larger 'false-false' cell. The more perfect the match, the less applicable both tests become.

[2] Sensitivity is a statistical measure of how well a binary classification test correctly identifies a condition. In the Figure, sensitivity is represented by the equation: TP/(TP + FN). Specificity is a measure of how well a binary classification correctly identifies the negative cases: TN/(FP + TN).

	Accepted	*Rejected*
Positive	True Positive (TP)	False Positive (FP)
Negative	False Negative (FN)	True Negative (TN)

[3] Lambda is a statistical measure of association, which reflects the proportional reduction in error when values of a variable x are used to predict values of a variable y. The value of each statistic can range from 0 to 1 and indicates the proportional reduction in error in predicting the value of one variable based on the value of the other variable. A value of 1 means that one variable perfectly predicts the other (Jahn, 1951; Stouffer, 1950). A description of Φ can be found in Cramer, 1999; Agresti, 2002.

3. Factor Scoring;

If clustering is to follow the suggested theoretical classification, a further statistical reduction towards a factor score per component is to be performed that will greatly facilitate subsequent empirical research.

A single factor score is to represent the relevant components found[1]. In order to avoid the influences of differences in scales of measurement used on the items in the questionnaire, factor score coefficients are used rather than factor loadings as weights in the final equations (DiStefano, Zhu & Mindrila, 2009). Missing values are to be replaced with mean estimates in order to include all respondents in obtaining factor scores, rather than excluding cases when following SPSS listwise-, or pairwise-options.

No adjustments, using e.g. Anderson-Rubin, or Bartlett methods, will be made to compensate for cross-component correlations resulting from the regression method used to produce the factor scores (Tabachnik & Fidell, 2001), as it has been argued that the concept of Motivation allows for a certain amount of overlap in variance to occur even in components obtained through EFA.

A final methodological analysis is to provide a rationale in generating factor scores.

5.4.2. Sampling

The empirical research is to be performed within a business environment, as indicated Chapter 2.4.3.3., consisting of a series of randomly approached companies[2].

No further sample characteristics, e.g. gender, age, socio-economic background, will be observed, as the research is primarily focused on elementary components capturing Motivation.

In determining an adequate sample size, it is assumed for a data-set consisting of 93 questions as indicated in Chapter 5.3., an indication of 10 participants per variable are needed for an adequate PCA to be performed (Nunnally, 1978; Kass & Tinsley, 1979), with a minimal sample size of n=300 (Comrey & Lee, 1992; Tabachnik & Fidell, 2001; Field, 2005). Where the concept of Motivation is expected to generate higher communalities in the data, n=300 will be used as a minimum standard, whereas data-sets generating elementary information should provide n > 1000 respondents. Furthermore, response percentages are to exceed 70%. For each sample, a KMO analysis of sampling adequacy will be made (Kaiser, 1970).

[1] The concept 'factor scoring' is used, although, given the choice for a PCA approach, a designation 'component scoring' would be more accurate; we adhere, however, to the customary use of the term.

[2] As will be indicated in Chapter 5.5.1., Chapter 5.6.1. and Chapter 5.6.2., the approach provided a 100% response from all companies approached.

Four sets of samples are to be approached in the empirical research:

- *Primary data-set, or 'Core Data' sample*; A sample to be approached at random by means of third parties, not directly related to the researcher[1]. Given the statistical demands as stated in Chapter 5.4.1.1., a total population of n > 1000 participants is aimed for. Given these numbers and the demands of targeting a high number of companies, a minimum is set for the Core Data to consist of at least 10 participating companies within one country to avoid cross-cultural interference. For an adequate sampling to occur, a response of companies approached must exceed 70%, and a subsequent sampling, as stated, must reach at least 70% respondents on average.
- In addition, three secondary data-sets, consisting of:
  - *Performance-related Data;* A set of samples aimed at capturing performance. With the Core Data sample available, lesser demands are formulated: sampling size is to follow general standards with n=300 and a minimal 70% response rate. Two sets of samples are to be generated:
    - *'Higher Ranking Performers';* A single sample of a 'best-in-class' company as indicated by current literature.
    - *'Lower Ranking Performers';* A single sample of a company that is under-performing as indicated by own standards.
  - *Culture-related Data;* A set of samples of companies from differing continents to compensate for effects especially associated with 'cross-cultural differences'. A minimum of three different regions worldwide, in addition to the Core Data region, are to be approached, with a minimum of 2 companies per region, with standard n=300 as a minimal sample size, and at least 70% response rate.
  - *Company-related Data;* A different set of samples is to be categorized according to the different company-related characteristics, aiming at a minimized set of characteristics. With the Core Data available, sampling size is set to a standard n=300 minimal at 70% response rate. The following set of samples is to capture a selection of company-related characteristics:
    - *Type-related Data;* A minimal of 2 x 2 samples of service-oriented companies versus production-oriented companies, to compensate for effects of 'company-types'. To avoid excessive data sampling, the subset is to be generated from available samples.
    - *Profile-related Data;* A minimal set of 2 x 2 samples of 'starters' versus 'established' companies, with a subset generated from available samples.
    - *Market position-related Data;* A minimal set of 2 samples of companies that are downsizing, the subset to be generated from available samples.

[1] Not all samples could be obtained using the sampling approach mentioned: three cross-cultural samples in Malaysia were obtained directly through the researcher. See Chapter 5.6.2.1.

5.4.3. Hypotheses

An analysis through PCA is to lead to elementary components, where following hypotheses are to be met to provide confirmation of an adequate reduction as indicated in the Problem Statement, Chapter 2.5.:

- *Given the Process of Motivation is captured by a Model of Motivation as described in summary in Chapter 3.3.,*
- *... and given this Model of Motivation is assumed to be operationalized through a questionnaire, thus enabling a quantification of effects,*
  following two hypotheses are formulated:
  a) *Hypothesis 1A (H1A): it is hypothesized that the elementary components reduced from a primary 'Core Data' set will include, according to criteria set in Chapter 5.4.1.1., items associated with the theoretical categorization of the most important Phases of the Model, according to concluding observations in Chapter 3.3.4., i.e. Phases 3 and 8: a Phase of Internally Evoked Self-Assessment and a Phase of Dedication.*
  b) *Hypothesis 1B (H1B): It is hypothesized that these elementary components will not only include the above mentioned items, but will follow, according to criteria set in Chapter 5.4.1.2., the theoretical categorization in Phases 3 and 8 from the Model and are each composed of questions that are comparable to the ones provided theoretically to operationalize these distinct Phases.*
- *Given the assumption that the Process of Motivation as described and captured by the Model, has a general stature, i.e. is applicable within any given population, it is hypothesized that the outcomes of a series of representative samples are assumed to yield comparable results, in terms of relevant components;*
  As such three additional hypotheses are formulated:
  a) *Hypothesis 2A (H2A): It is hypothesized that the components obtained from 'Performance-related Data' will yield comparable items as those obtained from the 'Core Data' sample.*
  b) *Hypothesis 2B (H2B): It is hypothesized that components obtained from a selection of 'Culture-related Data' will yield comparable items as those obtained from the 'Core Data' sample.*
  c) *Hypothesis 2C (H2C): It is hypothesized that components obtained from a selection of 'Company-related Data' will yield comparable results as those obtained from the 'Core Data' sample.*

It is assumed, when hypotheses H1A and H1B are fully met, and hypotheses H2A, H2B and H2C are substantially met, that the concept of Motivation has been adequately captured, and from the analysis the elementary constructs from the Model have emerged that represent the Process of Motivation, as indicated by the Problem Statement, Chapter 2.5.

Following a confirmation of hypotheses, it is assumed justified to use factor scores to capture and quantify the Process of Motivation in a verification of subsequent hypotheses.

5.4.4. *Conclusions*

The empirical research is to provide evidence of elementary constructs from the Model of Motivation, in terms of components and their respective items, capturing the Process of Motivation, thus providing evidence in support of the Model.

As proposed in Chapter 1.5., the Model is to provide an explanatory context from which elementary hypotheses, that are critical to the Model, can be derived. In concluding the inductive analysis in Chapter 3.3.4., two Phases were identified to be essential to the Model of Motivation: a Phases of Internally Evoked Self-Assessment and a Phase of Dedication. Both constructs, then, are to be elementary in the formulation of those hypotheses.

The empirical research, then, is to aim at a statistical reduction of a data-set and a subsequent comparison of data with a theoretical categorization of items operationalizing both Phases.

To perform the data-reduction a quantification of the Model of Motivation and its distinct elements is to be made, by means of a questionnaire operationalizing the distinct elements from the Model. As such, it is noted that in this dissertation the objective has been to capture distinct elements from the Model, not to design a measurement instrument.

To provide evidence of the elementary constructs capturing the Process of Motivation according to the Model as proposed in Chapter 3.3., EFA is to be used, rather than CFA, as the principal aim of the analysis is to explore the possible underlying structures in a set of interrelated variables without imposing any preconceived structure on the outcome. In the empirical research a reduction into elementary components is to be obtained by PCA, followed by a further reduction towards distinct factor scores per component.

In the proposed research a randomized and representative sample is supplemented by selections aimed at compensating for differences in Motivation-related performance, cross-cultural influences and for effects of company-related characteristics that are used to verify a hypothesized universal applicability of the Model.

Summarizing, a following research design is proposed:

- *Data Reduction*
  - *Study 1: Core Data: PCA*
  - *Study 2: Comparison with Model: aimed at verification of H1A, H1B*
- *Secondary Data Comparison*
  - *Study 3: Performance-related Data: PCA aimed at H2A*
  - *Study 4: Culture-related Data: PCA aimed at H2B*
  - *Study 5: Company-related Data: PCA aimed at H2C*
- *Factor Score-oriented Research*
  - *Study 6: Core Data generated Factor Scores*

5.5. Empirical Research
Data Reduction
5.5.1. Study 1: Principal Component Analysis Core Data

The Study generates its data from a random sample aimed at verification of H1A and H1B, with reference to Chapter 5.4.3.

1. Methodology

Sample; A total of 10 companies were approached, all located in Europe, The Netherlands, through third parties, as indicated in Chapter 5.4.2., over an eight-year period, consisting of 1549 participants in total. From companies approached, 100% participated in the research, with an average subject response rate of 88.9%. A short description of participating companies is provided in Appendix IV.

Summarizing details are provided in Table 5.1, including an overview of company characteristics as mentioned earlier in Chapter 5.4.2. Data collected in these 10 companies were pooled together to form the so-called 'Core Data' sample.

		Sampling date	n	N	Response	Company-type	Company-location	Company-profile	Company-marketp.	
			Abs	Abs	%					
1	Company I	02-1997	55	55	100.0%	P	NL	S		
2	Company II	09-1997	515	572	90.0%	P	NL	S		
3	Company III	07-1998	44	44	100.0%	S	NL	E		(1)
4	Company IV	01-1999	99	113	87.6%	P	NL	S		
5	Company V	11-1999	151	202	74.8%	P	NL	E	D	(1)
6	Company VI	12-1999	62	71	87.3%	P	NL	E		
7	Company VII	02-2000	69	78	88.5%	S	NL	E		
8	Company VIII	11-2000	104	107	97.2%	P	NL	E		(1)
9	Company IX	02-2002	176	176	100.0%	P	NL	E	D	(1)
10	Company X	12-2003	274	324	84.6%	S	NL	E		
		Totals	1549	1742	88.9%					

Notes:
(1) Sample consisted of Business Unit within larger company

Company-type: P=production, manufacturing-oriented, S=service-oriented
Company-location: NL=Europe, The Netherlands
Company-profile, or 'life-cycle': S='starter' (< 5yrs) E= 'established' profile (> 5yrs)
Company-marketposition: D=Down-sizing

Table 5.1.
Summarized sampling characteristics of the Core Data sample

Procedure; At each location, the HF-2.01 questionnaire was handed out in a classroom-setting were participants were sent by their immediate managers and asked to fill out the forms. A master list of employees was used to monitor response. No match, however, was made between this list and questionnaire-numbers to maintain confidentiality of the responses. Questionnaires were returned in blank, sealed envelopes. Data entry was performed by an external agency.

Measures; The different Stages of the Model of Motivation, organized in eight Phases, were captured in clusters of questions and scored using a forced-choice format, with different scalings. For a definition of distinct clusters, following references are made:

- Cluster 'Phase 1', as described Chapter 3.3.1.1.
- Cluster 'Phase 2', as described Chapter 3.3.1.2.
- Cluster 'Phase 3', as described Chapter 3.3.1.3.
- Cluster 'Phase 4', as described Chapter 3.3.1.4.
- Cluster 'Phase 5', as described Chapter 3.3.1.5.
- Cluster 'Phase 6', as described Chapter 3.3.1.6.
- Cluster 'Phase 7', as described Chapter 3.3.1.7.
- Cluster 'Phase 8', as described Chapter 3.3.1.8.

For constituting items within these clusters, reference is made to Appendix III, Section B.

Analysis; An EFA was performed using PCA, aimed at providing evidence of a match between components obtained and clusters of items captured according to the eight Phases of the Model. The analysis was to proceed in two consecutive steps:

- An EFA using PCA, as provided in the present Chapter,
- a comparative analysis, as provided in Chapter 5.5.2.

The PCA was performed to extract a series of initial components accounting for a substantial variance and thus providing an adequate description of the data-set. In a subsequent rotation phase a further reduction was made into elementary components capturing the Process of Motivation.

All assessments were made using standard SPSS procedures (Norusis, 1990).

2. Results

A number of preliminary analyses were performed on all 93 variables to determine item retention.

First, inter-item correlations were observed with no items exceeding scores of .80, indicating no singularity in data appeared, as defined earlier in Chapter 5.4.1.1. In observing the correlation matrix, the significance value of each correlation was determined and items with a majority of significance values exceeding .05 were

traced. Partial correlations between variables were observed in the anti-image matrix obtained in a subsequent analysis. 93.0% of partial correlations scored <.05, whereas only 1.1% scored ≥ .10. All items that did not comply with criteria defined in Chapter 5.4.1.1. were eliminated. As a consequence, 10 questions were removed from the analysis[1]. The observed Cronbach alpha obtained at this stage in the study was .72.

The resulting data-set consisted of 83 items. A further confirmation for an adequate PCA was obtained through a significant Bartlett's Test of Spherity (p<.00001) indicating no resemblance occurred to an identity matrix. A Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) was performed, with a .89 score indicating adequate sampling (Kaiser, 1974; Hutcheson & Sofroniou, 1999). Furthermore, all remaining 83 items scored (well) above a common .50 threshold on all individual variables (Kaiser, 1974; Field, 2005)[2].

A first general overview, with a primarily descriptive purpose, is provided in Table 5.2. Abbreviated items, with response rates, item-scale numbering, Means and SD are provided with percentages of inter-item correlations at p≤.05 and p≤.001 levels. For a full overview of inter-item correlations, reference is made to Appendix V.

A rotation was carried out on these remaining 83 items, using oblique rotation, through direct oblimin, with 21 components emerging with eigenvalues above 1.0. An average communality after extraction was obtained of .60, which, together with the sample size exceeding 250, meets criteria for an adequate extraction defined in Chapter 5.4.1.1.

An inspection of the scree plot, provided in Fig. 5.1., revealed there was a clear divide at 3 components and a second divide at 7 components[3]. These 7 components accounted for a cumulative 37.0% of total variance.

The inflexions justified isolating the first 3 components as primary components and the next 4 as secondary. Although emphasis in the analysis should be laid on the first 3 primary components, these remaining 4 secondary components should not be discarded entirely from the analysis and considered as a possible extension, or even alternative, to the primary components in capturing the concept of Motivation.

[1] These items produced a majority (≥ 50%) of significance values exceeding .05. With reference to Appendix III, Section B., these items included: h, k, m, n, af, ag, am, cm, dq and dw.

[2] 80 items scored above .70, with 3 items scoring lower: .668 (ad), .681 (dn) and .586 (ae).

[3] With following eigenvalues: Component 1: 11.84, Component 2: 5.95, Component 3: 3.47, Component 4: 2.57, Component 5: 2.39, Component 6: 2.33, Component 7: 2.13 and Component 8: 1.84, Component 9: 1.72, with Δ-values between component 6 and 7 of 0.20, between 7 and 8 of 0.29 and between 8 and 9 of 0.11.

	Item	N	Mean	SD	Scale	Inter-item Corr.	
						<.05	<.001
(1)	(2) (3)	(4)		(5)	(6)	(7)	(8)
l	I work extremely hard/could do much more	1462	6.67	2.92	15	52.44%	31.71%
L	I am "not at all"/"very ambitious"	1509	3.56	0.86	5	80.49%	65.85%
o	I am "easy to approach"/more "at a distance"	1507	2.05	0.91	5	79.27%	50.00%
q	In my work, I tend to set clear/unclear goals	1521	1.95	0.77	5	90.24%	75.61%
r	Outs. my work, I tend to set clear/unclear goals	1498	2.20	0.91	5	75.61%	60.98%
s	In my work, I tend to set a lot of goals/no goals	1511	2.47	0.76	5	91.46%	75.61%
t	Outs. my work, I set a lot of goals/no goals	1495	2.59	0.86	5	80.49%	53.66%
u	In my work, I set realistic/unrealistic goals	1513	1.96	0.71	5	79.27%	59.76%
v	Outs. my work, I set realistic/unrealistic goals	1495	2.03	0.75	5	70.73%	48.78%
w	In my work, I always/hardly ever reach my goals	1511	2.32	0.66	5	90.24%	70.73%
x	Outs. my work, I always/hardly ever reach goals	1495	2.28	0.67	5	78.05%	60.98%
y	In my work, I am sat./dissat. in the goals I set	1519	2.11	0.71	5	93.90%	82.93%
z	Outs. my work, I am sat./dissat. in goals I set	1501	1.90	0.72	5	85.37%	68.29%
ab	In my work, I tend not/tend to be dissapointed	1508	2.14	0.88	5	93.90%	79.27%
ac	Outs. my work, I tend not/tend to be dissapointed	1481	2.00	0.89	5	73.17%	52.44%
ad	In my work, I would stop/retry until the end	1507	3.98	0.85	5	81.71%	52.44%
ae	Outs. my work, I would stop/ retry until the end	1477	3.90	0.92	5	50.00%	20.73%
ai	In my work, I would spend, XX% of my energy	1516	90.61	13.09	9	89.02%	64.63%
aJ	… during XX% of my time	1499	82.73	17.58	9	74.39%	39.02%
aL	Outs. my work, I would spend, XX% of energy	1489	89.31	14.07	9	56.10%	36.59%
ao	In my work, I have a lot/no real "challenges"	1497	2.67	1.08	5	85.37%	65.85%
aq	Outs. my work, I have a lot/no real "challenges"	1481	2.50	0.89	5	58.54%	29.27%
at	In my work, I'd like to set more feasible goals	1522	3.67	1.75	7	60.98%	25.61%
au	In my work, I'd like to get sat. from things I do	1525	3.42	1.76	7	67.07%	46.34%
av	In work, I'd like to put more effort in things I do	1522	4.92	1.80	7	68.29%	32.93%
ba	Outs. my work, I'd like to set more feasible goals	1490	4.25	1.76	7	59.76%	24.39%
bb	Outs. work, I'd like to get more sat. from things	1489	4.61	1.74	7	68.29%	37.80%
bc	Outs. my work, I'd like to put more effort in things	1484	4.53	1.84	7	67.07%	42.68%
be	The company goals are clear/unclear to you	1519	2.40	1.22	5	76.83%	51.22%
bf	You do/do not agree with the company goals	1480	2.45	0.97	5	80.49%	53.66%
bg	Your work is not/is aimed at achiev. Comp. goals	1480	3.43	1.05	5	70.73%	39.02%
bi	Company goals do/do not interfere with my goals	1434	6.00	2.76	15	79.27%	54.88%
bk	Willing to change goals towards goals company	1473	3.55	1.42	7	80.49%	54.88%
bL	Ever changed goals to the company goals	1478	3.45	1.56	7	54.88%	28.05%
bm	I have reached the goals the company has set	1476	2.98	1.28	7	82.93%	68.29%
bn	My job contribution is significant to the company	1489	2.65	1.25	7	85.37%	71.95%
bp	How would you rate your performance	1519	6.54	0.97	8	95.12%	85.37%
bq	How would you rate your immediate manager	1506	5.55	1.65	8	64.63%	42.68%
br	How would your manager rate your performance	1501	6.25	1.09	8	91.46%	75.61%
bs	How would you rate performance of colleagues	1505	6.01	1.14	8	70.73%	51.22%
bv	I am satisfied/dissatisfied recognition manager	1506	2.60	1.02	5	57.32%	42.68%
bw	I have no fear at all/serious fear on job continuity	1516	2.21	1.22	5	70.73%	48.78%

Notes:
(1) Reference used
(2) Items are formulated in abbreviated format.
(3) Items h, k, m, n, af, ag, am, cm, dq and dw were omitted from the list, following a suitability analysis prior to PCA
(4) Respondents per item
(5) Standard Deviation; For each variable, missing values are replaced with the variable mean
(6) Likert-scale
(7) Percentages of inter-item correlations at p <.05
(8) Percentages of inter-item correlations at p <.001

Table 5.2.
Summarized statistics of the Core Data sample
A full overview of inter-item correlations is provided in Appendix V

	Item	N	Mean	SD	Scale	Inter-item Corr.	
						<.05	<.001
(1)	(2) (3)	(4)		(5)	(6)	(7)	(8)
Continued…							
bx	*Very/not at all confident management decisions*	*1506*	2.91	0.97	*5*	*69.51%*	*53.66%*
by	*Very/not at all confident about future company*	*1505*	2.37	1.06	*5*	*71.95%*	*59.76%*
cb	*Performance improvement: small/large*	*1265*	8.56	2.99	*15*	*70.73%*	*36.59%*
cc	*Working on improving your performance*	*1256*	2.62	0.97	*5*	*57.32%*	*21.95%*
ce	*I feel a lot of respect/no respect for company*	*1512*	2.95	1.27	*7*	*81.71%*	*68.29%*
cf	*I feel I am much/not respected by the company*	*1509*	3.31	1.35	*7*	*85.37%*	*70.73%*
cg	*I feel I am much/not dedicated to the company*	*1500*	2.63	1.23	*7*	*91.46%*	*81.71%*
ch	*I have invested a lot in the company*	*1507*	2.37	1.13	*7*	*87.80%*	*68.29%*
ci	*I feel I owe the company a lot*	*1508*	3.23	1.38	*7*	*80.49%*	*67.07%*
cn	*Effort is lower/higher, than it used to be*	*1496*	4.54	1.14	*7*	*69.51%*	*40.24%*
co	*Dedication to the company is lower/higher*	*1492*	4.24	1.10	*7*	*70.73%*	*46.34%*
cp	*Opinion company is more negative/ positive*	*1490*	3.92	1.29	*7*	*58.54%*	*39.02%*
cr	*I have met the expectations of the company*	*1483*	2.33	1.04	*7*	*92.68%*	*73.17%*
cs	*I am honored to work for the company*	*1505*	3.31	1.42	*7*	*76.83%*	*60.98%*
ct	*My respect for the company is extremely high*	*1506*	3.43	1.39	*7*	*79.27%*	*63.41%*
cv	*I tend to overestimate/underestimate myself*	*1516*	4.48	1.01	*7*	*59.76%*	*35.37%*
cw	*I tend to have a high/low self-esteem*	*1512*	4.04	1.00	*7*	*62.20%*	*40.24%*
cx	*Initiating things is easy/difficult*	*1514*	2.74	1.29	*7*	*82.93%*	*69.51%*
cy	*I like to be with people/take detached approach*	*1516*	2.46	1.28	*7*	*82.93%*	*65.85%*
cz	*I tend to appreciate things/tend to be critical*	*1514*	4.63	1.48	*7*	*64.63%*	*39.02%*
db	*I can easily change my opinion*	*1513*	4.59	1.24	*7*	*57.32%*	*25.61%*
dc	*I tend to make things brighter*	*1512*	4.85	1.40	*7*	*60.98%*	*28.05%*
dd	*I am inclined to review my actions*	*1510*	2.57	1.14	*7*	*84.15%*	*56.10%*
df	*I tend to set my expectancies very high/low*	*1509*	2.93	1.07	*7*	*87.80%*	*64.63%*
dg	*I tend to invest great/little effort*	*1510*	2.29	0.93	*7*	*89.02%*	*73.17%*
dh	*I tend to work for long/short periods of time*	*1502*	2.71	1.15	*7*	*86.59%*	*69.51%*
dJ	*I would characterize myself as: enthus./reserved*	*1516*	2.06	0.95	*5*	*90.24%*	*78.05%*
dk	*I would characterize myself as: optimistic/pess.*	*1498*	1.95	0.84	*5*	*91.46%*	*82.93%*
dL	*I would characterize myself as: realistic/speculat.*	*1512*	1.85	0.69	*5*	*69.51%*	*56.10%*
dm	*I would characterize myself as: active/withdrawn*	*1499*	1.84	0.78	*5*	*93.90%*	*85.37%*
dn	*I would characterize myself as: patient/impatient*	*1517*	2.52	1.09	*5*	*47.56%*	*18.29%*
do	*I would characterize myself as: sensitive/rational*	*1499*	2.67	1.06	*5*	*56.10%*	*26.83%*
dr	*I am persistent/I easily give up*	*1514*	1.75	0.67	*5*	*96.34%*	*82.93%*
ds	*I am firm/I am gentle*	*1511*	2.80	0.96	*5*	*75.61%*	*56.10%*
dt	*I am critical/I consent*	*1511*	2.11	0.80	*5*	*73.17%*	*59.76%*
du	*I am a leader/I am a follower*	*1513*	2.63	0.86	*5*	*82.93%*	*64.63%*
dv	*I am direct/I am tactful*	*1510*	2.43	1.02	*5*	*64.63%*	*35.37%*
dx	*I tend to choose carefully/impulsively*	*1511*	2.45	0.93	*5*	*58.54%*	*25.61%*
dz	*Summarizing, my dedication to the company*	*1517*	8.16	2.07	*11*	*95.12%*	*87.80%*
eb	*Summarizing, overall impression of the company*	*1516*	7.35	2.15	*11*	*76.83%*	*58.54%*
ec	*Summarizing, I would rate my motivation*	*1518*	8.60	1.86	*11*	*93.90%*	*81.71%*

Notes:
(1) Reference used
(2) Items are formulated in abbreviated format.
(3) Items h, k, m, n, af, ag, am, cm, dq and dw were omitted from the list, following a suitability analysis prior to PCA
(4) Respondents per item
(5) Standard Deviation; For each variable, missing values are replaced with the variable mean
(6) Likert-scale
(7) Percentages of inter-item correlations at p <.05
(8) Percentages of inter-item correlations at p <.001

Table 5.2 (Continued)
Summarized statistics of the Core Data sample
A full overview of inter-item correlations is provided in Appendix V

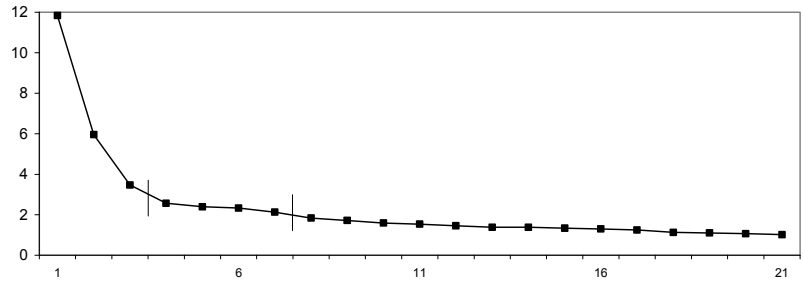

Fig 5.1.
Scree plot with eigenvalues and respective components (restricted to eigenvalues >.100)

Table 5.3. contains the 7 components as they emerged after rotation, and their respective items with component loadings as obtained from the pattern matrix. Component loadings of .40 or greater were considered significant and used to visualize the different components, as defined in Chapter 5.4.1.1. For an overview of all emerging components, reference is made to Appendix VI

Component 1 consisted of 8 items and appeared to measure Dedication, as exhibited by expressions of respect (e.g. items ce, ct), esteem (e.g. items cs, eb and ci), and expressed dedication (e.g. items cg and dz), with loadings ranging from .52 to .81. The internal consistency reliability estimate for component 1 was .90. Component 2 consisted of 4 items and appeared to represent items indicating Personality, (items ds, dt, du dv) with loadings ranging from .70 to .48. The reliability estimate of the component was .68. Component 3 contained 6 items, that appeared to represent an evaluation of Achievement (e.g. items ba, at and bc, av) and Satisfaction (e.g. items bb and au) with component loadings ranging from .79 to .40, yielding a .78 reliability estimate. *From these primary components 1, 2 and 3, component 2 produced a reliability estimate below the minimum criterion of .70 and was therefore discarded as a reliable indication of the concept of Motivation, as defined by initial standards set in Chapter 5.4.1.1. Consequently, the analysis provided two primary components 1 and 3, to be designated in the following as components 'DEDICAT' and 'ACHIEV' respectively.*

From the secondary components 4, 5, 6 and 7, component 4 consisted of 5 items and seemed to represent Personality-related scales: a cluster of items o, cy, dJ, dm and dk reflected elements from a Phase of Expectancies, with diversification in a Stage of Attitude, according to Appendix III, Section B. Component loadings ranged from .76 to .49, with an internal consistency reliability score of .78.

	Item	Components (3) (4)						
(1)	(2)	1	2	3	4	5	6	7
cs	*Honored to work for the company*	0.812						
ce	*Respect/no respect for company*	0.809						
ct	*Respect for the company is high*	0.766						
cg	*Dedicated to the company*	0.691						
eb	*Overall impression of the company*	-0.663						
ci	*Owe the company a lot*	0.647						
dz	*Dedication to the company*	-0.612						
cf	*Respected by the company*	0.521						
dt	*I am critical - consent*		0.701					
dv	*I am direct - tactful*		0.701					
ds	*I am firm - gentle*		0.586					
du	*I am a leader - follower*		0.478					
ba	*Outside work, setting goals*			0.789				
bc	*Outside work, investing effort*			0.761				
bb	*Outside work, obtaining satisfaction*			0.750				
av	*At work, investing effort*			0.679				
at	*At work, setting goals*			0.550				
au	*At work, obtaining satisfaction*			0.401				
o	*I am easy - distant*				0.759			
cy	*I socialize - take a detached approach*				0.746			
dJ	*I am enthusiastic - reserved*				0.734			
dm	*I am active - withdrawn*				0.555			
dk	*I am optimistic - pessimistic*				0.491			
dx	*I am cautious - impulsive*					-0.760		
dn	*I am patient - impatient*					-0.657		
l	*I work hard - could do much more*						0.612	
ch	*Invested a lot in the company*						0.585	
bn	*Contribution is significant*						0.560	
bm	*Reached the goals the company has set*						0.445	
cr	*Met the expectations of the company*						0.419	
ai	*At work, would spend XX% of energy*							0.852
aJ	*… during XX% of time*							0.779
aL	*Outs. work, would spend XX% of energy*							0.759
	Initial eigenvalues	*11.836*	*5.952*	*3.473*	*2.567*	*2.394*	*2.330*	*2.130*
	Alpha coefficient for final components	*.90*	*.68*	*.78*	*.78*	*.44*	*.55*	*.71*

Notes:
(1) Reference used
(2) Items are formulated in abbreviated format. A full overview of items is provided Appendix III
(3) Oblique rotation (direct oblimin) with Kaiser normalization
(4) Only factor loadings >.400 are visualized

Table 5.3
Principal Component Analysis Core Data sample;
Pattern Matrix of seven primary and secondary components extracted through nonorthogonal rotation.

Component 5 contained only two Personality-oriented items dx and dn with a modest reliability estimate of .44. Component 6 consisted of 5 items, representing an evaluation of the company of the investment made by the individual. With a cluster of items i, ch, bn, bm and cr, the component reflects Reality, as indicated in Appendix III, Section B. The internal consistency reliability estimate for component 6, however, was a modest .55. Finally, component 7 included items ai, aJ, aL indicating Effort, with loadings ranging from .85 to .76, and a reliability estimate of .71. *These secondary components 4, 5, 6 and 7 were evaluated according to standards of Chapter 5.4.1.1., resulting in elimination of components 5 and 6 with reliability estimates below .70. The analysis therefore provided two secondary components, 4 and 7 to be designated as components 'ATTITUD' and 'EFFORT' respectively.*

As a result the PCA produced 4 components, 2 primary and 2 secondary, to capture the concept of Motivation. However, after nonorthogonal rotation and a successful reduction of the initial components to their respective principal dimensions, as set forth in Chapter 5.4.1.1., a dilemma emerged in obtaining a final indication of adequacy of the components that had been isolated. The oblique rotation provided an optimal approach for reducing the concept of Motivation that appeared to demonstrate a considerable shared variance among components. But the oblique rotation did not allow an adequate verification in terms of maximized shared variance. As a result of the rotation, items initially contained within the 7 initial components, had been re-allocated towards other components thereby changing the eigenvalues of these resulting components and the assumed variance they accounted for. In using a nonorthogonal rotation, the rotated components shared common variance and consequently variance could not be partitioned uniquely among components. As a result, a cumulative variance could not be deduced for isolated components.

Oblique rotation enables an adequate reduction towards correlated components, but deprives the analysis of an indication of shared variance. An additional rotation was performed, using an uncorrelated orthogonal varimax rotation. A demonstration of measurement equivalence, obtaining corresponding components with equal items loading on each component, would provide additional evidence of a successful extraction (Ryan, *et al.,* 1999).

Given the substantial number of variables, the results coincided largely with the original PCA-generated data obtained through the oblique, direct oblimin rotation (Guadagnoli & Velicer, 1988; Stevens, 2002). With reference to Appendix VII, All items contained in component 1 from the direct oblimin rotation matched those obtained in component 1 of the varimax rotation, with only 1 item (ec) unmatched in the latter. There was a complete match in both components 3 following direct oblimin and varimax rotations, and a complete mach between component 4, following direct oblimin and component 2 following varimax rotations. A subsequent analysis of eigenvalues and total variance explained following varimax rotation, revealed a primary ranking of these three components accounting for a

cumulative 15.56% of total variance[1]. *Although the component loading weights varied slightly across both approaches, the PCA yielded the same components and similar item loading patterns. The near perfect item match between both extraction techniques provided a further indication that elementary components were obtained.*

Finally, in a short analysis of pairwise and listwise approaches to handling of missing data, same results were obtained, with reference to Appendix VIII and Appendix IX respectively, adding further confirmation to these general findings.

3. Discussion

A principal aim of PCA and factor extraction was to obtain the elementary components of the Process of Motivation. First indications are that four components were obtained that met the criteria initially set in Chapter 5.4.1.1. And if so, a first and important step has been made not only towards isolating these elementary components, but also towards providing a means of having an objective representation of the concept, capturing its true signature.

A number of limitations apply, however.

A first and obvious limitation lays in the questionnaire HF-2.01: answers are pre-coded and do not provide an opportunity for personal nuance. Moreover, the sequence of questions as contained in the questionnaire could have influenced the outcomes, especially in component ACHIEV.

A second limitation is that data were obtained exclusively from the Netherlands, and relations may differ in other countries (Fletcher & Perry, 2001). Nonetheless, representativity of the samples meets criteria initially set in Chapter 5.4.2., with response rates in excess of 85%. In Chapter 5.6.2., these findings will be supplemented with culture-related data from other countries.

Furthermore, it is stressed again at this point that, the present research consists of a first study to verify the accuracy of the Model of Motivation in representing the Process of Motivation. The questionnaire was aimed primarily at capturing distinct elements from the Model and was not designed as a measurement instrument. As indicated in Chapter 5.3., to apply the questionnaire as a measurement instrument, further research is needed to provide additional data for assessing various psychometric characteristics in terms of reliability and validity.

[1] An analysis of component 7 following direct oblimin, matched component 11 through varimax rotation accounting for 2.47% of variance, resulting in a total variance explained through these 4 primary and secondary components of 18.03%.

Finally, a concluding observation on results obtained. There is a fundamental objection to the conclusion of having found Motivation in its 'most important' components by means of PCA. And the objection lays in the interpretation of PCA in general, and the non-orthogonal oblique oblimin extraction in particular. PCA does not provide a means of distilling the 'most important' components from a data-set. Before extraction, eigenvalues associated with each component represent the variance explained by that particular linear component, and therefore provide an indication of the percentage of variance explained by that factor. As such, first 7 components accounted for a substantial amount of total variance, as indicated in initial criteria set. In terms of variance explained, these 7 are most important, but variance in itself does not provide an indication of causality, or a validation for a comprehensive description of the concept. The study has chosen not to provide indications for causality, or comprehensiveness as a criterion, but rather to 'capture the concept in its essential nature'. As such, it has chosen these 7 components, on a criterion of representation: these 7 were best suited, on the basis of variance explained. From these initial components, the elementary components were extracted, in the assumption that these components have the effect of optimizing the underlying component structure. The elementary components obtained, cannot be designated at this stage as being 'most important'. A subsequent comparison with the Model and an optimal fit, in terms of interpretability of the data obtained, is to provide a final indication of the merit of the elementary components that were found. As Meyers et al. eloquently summarized: 'if you have to articulate a bottom line for characterizing what researchers finally select, (it is) ... the reasonableness of the interpretation' [1].

4. Conclusion

A data-set, representing a Model of Motivation has been reduced to elementary components by means of PCA, using nonorthogonal rotation techniques. After eliminating components that did not meet internal consistency reliability standards, two primary components were isolated, designated as DEDICAT and ACHIEV. From a secondary set of components, two additional clusters were isolated, designated as ATTITUD and EFFORT.

In a preliminary conclusion these primary and secondary components are to be matched with the Model of Motivation to obtain evidence if these components reflect the elementary constructs suggested by the Model, as called for in our Problem Statement. Emphasis should be laid, however, on the primary components, with the secondary components to be considered as experimental and an extension, or possibly an alternative, of the indices suggested by the Model.

[1] Meyers, Gamst & Guarino, 2006, p. 512.

5.5.2. Study 2: Model Comparison

The study is aimed at verification of hypotheses H1A and H1B, with reference to Chapter 5.4.3. A comparison is to be made between items capturing the eight Phases of the Model of Motivation, indicated as 'clusters', and the components obtained through PCA from the Core Data sample.

1. Methodology

Measures; Components obtained from the Core Data sample were defined as primary and secondary components. Emphasis in the analysis was to be laid on the primary components, with secondary components considered as extension or alternative in capturing the concept of Motivation. Primary components were components with highest eigenvalues, accounting for highest percentages of variance amongst items. As stated in Chapter 5.5.1.3., a subsequent comparison with the Model of Motivation and an optimal fit, in terms of interpretability of the data obtained, is to provide a final indication of the merit of the elementary components that were found. For this reason, the study will include in its analysis not only primary components, but also secondary components that were obtained after rotation following the PCA.

The elementary components, then, that are assumed to capture the Process of Motivation, are defined as follows:

- Primary component DEDICAT, consisting of items referenced as: ce, cf, cg, ci, cs, ct, dz and eb
- Primary component ACHIEV, consisting of items referenced as: at, au, av, ba, bb and bc
- Secondary component ATTITUD, consisting of items referenced as: o, cy, dj, dk and dm
- Secondary component EFFORT, consisting of items referenced as: ai, aj and aL

For a full description of references used in designating items, see Appendix III, Section B., for an abridged overview, see Table 5.3.

Analysis; The analysis was to proceed in two consecutive steps:

- An EFA using PCA, as provided in Chapter 5.5.1.,
- a comparative analysis, as provided in the present Chapter

As a consequence of restrictions applying to comparing 2x2 matrices at a nominal level, as indicated Chapter 5.4.1.2., the analysis was performed using several measures of comparison. A measure of relative overlap was provided by indicating sensitivity and specificity. A measure for inferring an indication of strength and significance in results obtained, was provided by Phi and symmetric Lambda coefficients. As in isolating the primary and secondary components, a match would be achieved with both Φ and λ significant at $p<.05$.

2. Results

An overview of measures obtained from the comparative analysis is provided in Table 5.4.

Component Comparison	*Overlap*	*Sensitiv.*	*Specific.*	*Φ*	*Λ*
	%	%	%		
(1) (2)	*(3)*	*(4)*	*(5)*	*(6) (7)*	*(8) (9)*
1 *Model Phase 8 vs Core Data DEDICAT*	100.0%	100.0%	100.0%	*1.000****	*1.000***
2 *Model Phase 3 vs Core Data ACHIEV*	100.0%	100.0%	100.0%	*1.000****	*1.000**
3 *Model Phase 1 vs Core Data ATTITUD*	15.0%	15.0%	96.8%	*.213*	*.040*
4 *Model Phase 2 vs Core Data EFFORT*	50.0%	50.0%	100.0%	*.694****	*.333*

Notes:
(1) Item Cluster Phase 8 consists of questions ce, cf, cg, ci, cs, ct, dz and eb
Item Cluster Phase 3 consists of questions at, au, av, ba, bb and bc
Item Cluster Phase 1 consists of questions L, q, r, s, t, u, v, w, x, y, z, cx, dJ, dk, dL, dm, ds, dt, du and dv
Item Cluster Phase 2 consists of questions ai, aJ, aL, df, dg and dh. Question am, initially included, was later omitted
(1) Core Data Component DEDICAT consists of items ce, cf, cg, ci, cs, ct, dz and eb
Core Data Component ACHIEV consists of items at, au, av, ba, bb and bc
Core Data Component ATTITUD consists of items o, cy, dj, dk and dm
Core Data Component EFFORT consists of items ai, aj and aL
(3) Percentage overlap relative to Core Data sample
(4) Sensitivity is represented by the equation: TP/(TP + FN), where TP=True Positive Classification, FN=Fake Negative Classification. See Chapter 5.4.1.2 Comparative Analysis of Matrices
(5) Specificity is represented by the equation: TN/(FP + TN), where TN=True Negative Classification, FP=Fake Positive Classification. See Chapter 5.4.1.2 Comparative Analysis of Matrices
(6) Phi Coefficient
*(7) * p < .05, ** p < .01, *** p < .001*
(8) Guttman's Coefficient of Predictability Lambda
*(9) * p < .05, ** p < .01, *** p < .001*

Table 5.4.
Comparative Analysis Model of Motivation and Core Data sample;
Clusters of questions indicating different Phases of the Model compared to 4 elementary components obtained from PCA; Measures not meeting criteria are shaded.

Row 1 contains the parameters of a comparison between clusters of items capturing Phase 8, a Phase of Dedication, within the Model of Motivation as indicated in Appendix III, Section B., and those obtained from the PCA designated as component DEDICAT. Both clusters of items matched completely, with both sensitivity and specificity of 100%, resulting in Φ and λ scores significant at p<.01.

Row 2 contains parameters of a comparison between the cluster of questions operationalizing Phase 3, a Phase of Internally Evoked Self-Assessment as indicated in Appendix III, Section B., with the items contained in component ACHIEV. Again, both clusters matched completely with equivalent scores as those obtained for Phase 8 and DEDICAT.

Row 3 indicates the parameters of a comparison between Phase 1, a Phase of Expectancies, with items from component ATTITUD. There was no significant

match, however, between both clusters[1].

Likewise, in comparing a Phase of Effort to component EFFORT, a match was insufficient, yielding only a significant result on a Φ coefficient.

These results were evaluated according to standards defined in Chapter 5.4.1.2. As a consequence, the two secondary components ATTITUD and EFFORT were eliminated from the analysis.

As a principle outcome, then, the primary components DEDICAT and ACHIEV were found to meet the criteria initially set. And, as a consequence, both hypotheses seem to be supported, as formulated at the onset of the analysis. It was hypothesized that the elementary components reduced from a primary Core Data-set, would include all items associated with the theoretical categorization of the most important Phases of the Model, i.e. Phases 3 and 8 (H1A). Both components DEDICAT and ACHIEV do include these items as suggested by the Model and formulated in Appendix III, Section B. Moreover, not only do both clusters coincide, they also match the distinction made in the respective Phases 3 and 8, as formulated in the second hypothesis. It was hypothesized that these elementary components, would not only include the above mentioned items, but would follow the theoretical categorization in Phases 3 and 8 from the Model and are each composed of questions that are comparable to the ones provided theoretically to operationalize these distinct Phases (H1B). Component DEDICAT matches completely with items suggested operationalizing a Phase of Dedication, component ACHIEV, matches with those operationalizing a Phase of Internally Evoked Self-Assessment.

The results of the study, then, provide support for the general hypothesis that elementary components captured through data reduction, indicated by primary components DEDICAT and ACHIEV, do match with those suggested by the Model of Motivation, thus providing empirical evidence in support of the proposed Model.

3. Discussion

Following an oblimin rotation, initial components were reduced to two sets of elementary components, two primary and two secondary. These four components contained the items that described the 'essential nature' of Motivation according to the PCA and associated data reduction techniques. From a subsequent comparative analysis it was found that primary components matched completely with the items suggested theoretically through the Model, describing the Process of Motivation in its essential nature. As a result, it was decided to discard the two secondary components as being less adequate to provide substantial additional descriptive

[1] The component ATTITUD matched with a specific Stage within the Phase of Expectancies, i.e. a Stage of Attitude. The analysis, however, did not focus on separate Stages and was therefore discarded from the study.

information.

Two additional comments are made to substantiate this conclusion.

First, the Problem Statement called for items capturing the Process of Motivation in elementary constructs, not for a summative set of describing items. Discarding the secondary components is not to be interpreted as eliminating elementary components as suggested through PCA, but rather as a further reduction towards the essential nature of Motivation supported by theoretical arguments.

In addition, the perfect match between elements obtained though PCA and the theoretically induced items from the Model of Motivation, does provide additional evidence that the primary components that were isolated can be considered adequate in describing the concept in its essential nature.

The conclusion, therefore, seems justified to identify the primary components DEDICAT and ACHIEV as being the elementary components capturing the Process of Motivation.

However, in reaching these conclusions, a number of limitations must be considered.

Although the extraction and subsequent data comparison justify isolating components DEDICAT and ACHIEV, it was observed in Chapter 5.5.1.2., that emphasis in the analysis was laid on these primary components as the secondary components produced lower eigenvalues, as indicated in Fig. 5.1., by a second inflexion of the scree plot curve. However, it is to be noted that with the various eliminations of components the initial eigenvalue of component ACHIEV (3.473, as indicated Table 5.3.), approaches the values of both secondary components ATTITUD (2.507) and EFFORT (2.130). Although criteria defined in Chapter 5.4.1.1. and Chapter 5.4.1.2. justify an identification of the primary components, some caution is to be expressed especially on component ACHIEV, based on these initial eigenvalues, in capturing Motivation.

A second limitation follows directly from these comments aiming at capturing Motivation in essential components rather than in a summative set of describing items. In using the outcomes from the present study, it is to be explicitly stressed that the elementary components are not covering the concept of Motivation in its entirety, but rather in its essentials. The Model of Motivation is assumed to comprise all eight Phases of the Model. Within these eight Phases, Phases 8 and 3, expressed in components DEDICAT and ACHIEV, are to be considered essential, but they do not eliminate or replace other Phases from the Process.

Finally, in addition to these conceptual limitations, it is to be noted, that the research was restricted to a first validation and reduction to elementary constructs. The Model was assumed to represent the Process of Motivation. Additional research will be needed to verify and further validate these claims.

4. Conclusion

In a second study, a comparison was made between clusters of questions assumed to indicate the most important Phases 3 and 8 within the Model of Motivation, and the elementary components obtained through PCA.

Hypotheses initially formulated were found to be supported. In hypothesis 1A (H1A) it was assumed that the components reduced from a primary Core Data-set, would include all items associated with the theoretical categorization of the most important Phases of the Model, i.e. Phases 3 and 8. In hypothesis 1B (H1B) it was assumed that these components, would not only include the above mentioned items, but would follow the theoretical categorization in Phases 3 and 8 from the Model and would each be composed of questions that are comparable to the ones provided theoretically to operationalize these distinct Phases.

With both components DEDICAT and ACHIEV matching items operationalizing Phases 8 and 3 respectively, hypotheses H1A and H1B were met.

It is concluded that the analysis produced elementary constructs matching those from the Model of Motivation, and consequently, that the empirical research provided evidence of elementary constructs from the Model, in terms of components and their respective items, matching those suggested capturing the Process of Motivation, thus providing empirical evidence in support of the Model.

5.5.3. *Conclusions*

Given the Problem Statement, the empirical research was aimed at tracing the elementary components that capture the concept of Motivation, while preserving, as much as possible, its original signature.

On the initial set of questions, a data reduction was performed in Study 1 through PCA, resulting in two sets of components, one primary and one secondary. Emphasis was to be laid on the primary components, with the secondary components to be considered as experimental and an extension, or possibly an alternative, in adequately capturing the concept of Motivation.

In a subsequent comparative analysis in Study 2, these items obtained through PCA were matched with clusters of questions operationalizing most important Phases 3 and 8 from the Model of Motivation, as obtained from the theoretical inductive inference as reported in Chapter 3. In the analysis it was found that secondary components did not meet criteria and were discarded. Primary components, however, appeared to match completely with those suggested from the theoretical Model.

As such, these primary components, designated as components 'DEDICAT' and 'ACHIEV' were found to match those suggested by the Model of Motivation, and indicative of Phases 3 and 8:

- *Component DEDICAT, consisting of items: ce, cf, cg, ci, cs, ct, dz and eb.*
- *Component ACHIEV, consisting of items: at, au, av, ba, bb, bc*

Following these results, it was concluded that hypothesis H1A, assuming both components would include all relevant items, and hypothesis H1B, assuming these components would match with items distinctly associated with Phases 3 and 8, both were supported by the studies.

The empirical research, then, provided evidence that components DEDICAT and ACHIEV as obtained from the analysis, are the elementary constructs called for in the Problem Statement, Chapter 2.5., that capture the Process of Motivation.

5.6. Empirical Research
Secondary Data Comparison

Given the assumption that the Model of Motivation has a general stature and is therefore applicable within any given population, it is hypothesized that the outcomes of a series of representative samples are assumed to yield comparable results to those obtained from the previous analysis, where components DEDICAT and ACHIEV were isolated as being the elementary constructs capturing the Process of Motivation.

Three additional Studies are briefly presented in a Secondary Data Comparison to verify these assumptions.

5.6.1. Study 3: Performance-related Data

A first analysis observes data from a sample of so-called 'Higher Ranking Performers' and ' Lower Ranking Performers' aimed at verification of H2A, with reference to Chapter 5.4.3.

1. Methodology

Sample; Following commentaries in literature[1] and an overall classification as 'best

[1] Two references were used, classifying companies as 'best-in-class' according to research based on both company-related data and survey results:

- Kinni, T.B. (1996). *America's Best - Industry Week's Guide to World-Class Manufacturing Plants.* New York: John Wiley.
- Levering, R., & Moskowitz, M., (1994). *The 100 Best Companies to Work For in America.* New York: Plume, Penguin Books.

company' according to the American Malcolm-Baldrige Award[1], a single company was approached as 'Higher Ranking Performer'[2]. Within this multinational company, with several business units and a range of production plants world-wide, a single location was selected that outperformed all other business units within this company, based on an internal award-structure as a selection criterion[3]. The facilities were located in South-East Asia, Malaysia, Penang. From the 24 hour shift production group of employees a 10% random sample was taken and pooled to all non-production employees, including staff, middle and higher management, resulting in a n=358 sample, with 100% response rate.

Next, from all companies participating in this dissertation, 22 in total, the company with the lowest summative mean score average on all 83 items, was selected as 'Lower Ranking Performer'. Although the sample size did not meet criteria set in Chapter 5.4.2., with n=134, no additional samples from other companies were added in order to preserve the integrity of the selection made.

A short description of both companies, referred to as Company XI and Company XII respectively, is provided in Appendix X. Summarizing details are provided in Table 5.5.

Procedure; At both locations, the HF-2.01 questionnaire was handed out in a classroom-setting. The procedure as described in Chapter 5.5.1.1. was followed at both locations. The questionnaire was translated and made available both in English and in Bahassa Malaysia at Company XI facilities.

Measures; Given a presumed hypothesis *H2A* a comparison was to be made between the components obtained through PCA from the Core Data sample and those obtained from both Higher and Lower Ranking Performer samples in the assumption that comparable data would emerge[4].

[1] The Malcolm Baldrige National Quality Improvement Act of 1987, signed by President Ronald Reagan on August 20th 1987, established an annual U.S. National Quality Award aimed at promoting quality awareness and recognizing quality achievements of U.S. companies. Areas that were examined included leadership, human resource utilization and customer satisfaction, among others.

[2] In the period 1988 – 1996 a single company emerged from both categorizing overviews that had also won the Malcolm Baldrige Award. The company was referenced as 'Company XI' in the Study.

[3] The criterion refers to so-called 'TCS Teams' as described in Harvard Business Case 9-494-139, Harvard Business School, October 20th 1994.

[4] Study 3 aims exclusively at a verification of hypothesis *H2A* where Performance-related Data from a sub-sample are assumed to produce same results as those obtained from the Core Data sample. Consequently, no additional comparisons are made of elementary components obtained from the sub-sample and clusters of items from the Model of Motivation.

	Sampling date	n	N	Response	Company-type	Company-location	Company-profile	Company-marketpos.	
		Abs	Abs	%					
1 *Company XI*	*01-1997*	358	358	100.0%	*P*	*M*	*E*		(1)
2 *Company XII*	*04-1999*	134	157	85.4%	*P*	*NL*	*E*		(1)
	Totals	492	515	92.7%					

Notes:
(1) Sample consisted of Business Unit within larger company

Company-type: P=production, manufacturing-oriented, S=service-oriented
Company-location: NL=Europe, The Netherlands, M=South-East Asia, Malaysia
Company-profile, or 'life-cycle': S='starter' (< 5yrs) E= 'established' profile (> 5yrs)
Company-marketposition: D=Down-sizing

Table 5.5.
Summarized sampling characteristics of the Performance-related Data samples

Components obtained from the Core Data sample, are defined as follows:

- Component DEDICAT, consisting of items referenced as: ce, cf, cg, ci, cs, ct, dz and eb
- Component ACHIEV, consisting of items referenced as: at, au, av, ba, bb and bc

For a full description of references used in designating items, see Appendix III, Section B., or Table 5.3. for an abridged overview.

Components from both Higher and Lower Ranking Performers samples were obtained through PCA.

Analysis; The analysis was to proceed in two consecutive steps:

- An EFA, using PCA,
- and a comparative analysis.

The PCA as described in Chapter 5.4.1.1., was performed using oblique rotation, with direct oblimin, on the 83 variables comparable to those obtained in the Core Data sample. No further variables were omitted as the analysis was solely aimed at a comparative analysis.

The comparative analysis was performed using several measures of comparison, as described in Chapter 5.4.1.2. A measure of relative overlap was provided by indicating sensitivity and specificity. A measure for inferring an indication of strength and significance, was provided by Phi and symmetric Lambda coefficients.

2. Results

A Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) was performed, with a .80 score for the Higher Ranking Performer sample, and a .58 score for the Lower Ranking Performer sample, indicating a less adequate representativity in the latter, as indicated earlier. For both samples a significant Bartlett's Test of Spherity ($p<.00001$) was obtained.

From the PCA 24 components for both the Higher and Lower Ranking Performer samples emerged with eigenvalues above 1.0. An average communality after extraction was obtained of .68 for the Higher and .74 for the Lower Ranking Performer samples. Inflexions of the scree plot justified isolating the first 4 components for the Higher Ranking Performer sample, and the first 3 for the Lower Ranking Performer sample, as indicated in Appendix XI, Fig. A and B., respectively[1].

A subsequent nonorthogonal rotation, using oblique rotation through direct oblimin, further reduced these components, following the rationale as indicated in Chapter 5.4.1.1. Appendix XII contains the 4 components for the Higher Ranking Performer sample as they emerged after rotation, and their respective items with component loadings as obtained from the pattern matrix, together with the internal consistency reliability estimates for each component. Appendix XIII contains the 3 components for the Lower Ranking Performer sample.

The comparative analysis between the elementary components DEDICAT and ACHIEV, obtained from the Core Data sample, and the components isolated in both Higher and Lower Ranking Performer samples was performed through parameters defined in Chapter 5.4.1.2., reproduced in Table 5.6.

Row 1 contains the parameters for a comparison between the Core Data items as obtained for component DEDICAT and those from component 1 from the Higher Ranking Performer sample. The data indicates there is a poor match between both clusters with a sensitivity of 37.5%. A match with the Lower Ranking Performer sample provides a better match, as indicated in row 2, although λ scores remain below a $p<.05$ significance level.

In a comparison between the Core Data sample and Higher and Lower Ranking Performer samples for component ACHIEV, however, a match is achieved in both cases with Φ and λ scores significant at $p<.05$, or even $p<.01$ for the Higher Ranking Performer sample, as indicated in rows 3 and 4 respectively.

[1] At this stage of the study no further distinctions were made in primary and secondary components.

	Component Comparison	Overlap % (2)	Sensitiv. % (3)	Specific. % (4)	Φ (5) (6)	Λ (7) (8)	
	Component DEDICAT						
1	Core Data versus Higher Ranking Perform.	37.5%	37.5%	96.0%	.382*	.000	(9)
2	Core Data versus Lower Ranking Perform.	75.0%	75.0%	97.3%	.723***	.500	
	Component ACHIEV						
3	Core Data versus Higher Ranking Perform.	100.0%	100.0%	100.0%	1.000***	1.000**	
4	Core Data versus Lower Ranking Perform.	83.3%	83.3%	100.0%	.907***	.818*	

Notes:
(1) Core Data Component DEDICAT consists of items ce, cf, cg, ci, cs, ct, dz and eb
Core Data Component ACHIEV consists of items at, au, av, ba, bb and bc
(2) Percentage overlap relative to Core Data sample
(3) Sensitivity is represented by the equation: TP/(TP + FN), where TP=True Positive Classification, FN=Fake Negative Classification. See Chapter 5.4.1.2 Comparative Analysis of Matrices
(4) Specificity is represented by the equation: TN/(FP + TN), where TN=True Negative Classification, FP=Fake Positive Classification. See Chapter 5.4.1.2 Comparative Analysis of Matrices
(5) Phi Coefficient
(6) * p < .05, ** p < .01, *** p < .001
(7) Guttman's Coefficient of Predictability Lambda
(8) * p < .05, ** p < .01, *** p < .001
(9) Level of significance could not be computed because the asymptotic standard error equals zero

Table 5.6.
Comparative Analysis Core Data sample and Performance-related Data; Components DEDICAT and ACHIEV; Measures not meeting criteria are shaded.

These results were evaluated according to standards provided Chapter 5.4.1.2. As a principle outcome, component DEDICAT was found not to meet criteria set; component ACHIEV, however, appeared to match the data in both Higher and Lower Ranking Performer samples. As a consequence, hypothesis H2A, where it was assumed that Performance-related Data would yield comparable components as those obtained from the Core Data sample, was only partly met.

3. Discussion

Limitations to the questionnaire, the resulting data-set and PCA extraction techniques were covered earlier in a Discussion, Chapter 5.5.1.3. Most important limitation, obviously, was the limited sample size of the Lower Ranking Performer sample. Nonetheless, both samples demonstrated a comparable component ACHIEV, indicating a similarity in importance of a Phase 3 of the Model. In both samples, a resulting DEDICAT component, produced divergent data, reflecting sharp differences in perceived support, as might be expected in both Performance-related Data samples.

An interesting avenue for future research would be to focus on these effects in additional data, especially from Lower Ranking Performers.

4. Conclusion

The results of the first comparative analysis, then, provide only partial support for the hypothesis that Performance-related Data would provide comparable outcomes as those obtained from the Core Data sample.

In both a Higher and Lower Ranking Performer setting, component ACHIEV, reflecting a personal self-evaluation in Phase 3 from the Model, seems an adequate construct. However, for component DEDICAT, reflecting experienced support from Reality in Phase 8, no such evidence was obtained.

5.6.2. Study 4: Culture-related Data

At the onset of the study, it was assumed that the Model of Motivation has a general stature. Findings that indicate that components DEDICAT and ACHIEV are the elementary constructs capturing the essence of the Process of Motivation, lead to assume that comparable results are to be obtained from samples taken from countries with a different cultural background than the European setting in which the Core Data was taken. In the next study, it is hypothesized that the outcomes of a series of samples from three locations world-wide with differing socio-economic and cultural backgrounds are assumed to yield comparable results to the ones obtained from the analysis of the Core Data.

A second analysis, then, will aim at a selection of so-called 'Culture-related Data' aimed at verification of H2B, with reference to Chapter 5.4.3.

1. Methodology

Sample; Three sets of samples, were taken, consisting of 8 companies in three different locations to draw up the Culture-related Data sample. In South-Africa, 3 companies were approached to participate, in the US 2 companies were approached, and in Malaysia 3 companies. From these 8 companies, 5 were approached by third parties and 3 by the researcher[1].

In order to provide internal consistency in the composition of the samples, only respondents from lower, middle and higher management were included; as such, respondents at dl-levels within the Malaysian sample were excluded.

A short description of participating companies, referred to as Company XIII to Company XX, is provided in Appendix X. Summarizing details are provided in Table 5.7.

[1] Thus conflicting with criteria originally set in Chapter 5.4.2.

		Sampling date	n	N	Response	Company-type	Company-location	Company-profile	Company-marketpos.	
			Abs	Abs	%					
	Malaysia									
1	*Company XIII*	*07-1997*	214	214	100.0%	*P*	*M*	*E*		(1)
2	*Company XIV*	*07-1997*	159	159	100.0%	*P*	*M*	*E*	*D*	(1)
3	*Company XV*	*01-1999*	140	140	100.0%	*P*	*M*	*E*		(1)
		Totals	513	513	100.0%					
	South-Africa									
4	*Company XVI*	*10-1998*	126	142	88.7%	*P*	*SA*	*E*		
5	*Company XVII*	*10-1998*	131	140	93.6%	*P*	*SA*	*E*		
6	*Company XVIII*	*10-1998*	149	160	93.1%	*P*	*SA*	*E*		
		Totals	406	442	91.8%					
	United States									
7	*Company XIX*	*06-1996*	171	174	98.3%	*S*	*US*	*E*		(1)
8	*Company XX*	*04-2002*	116	116	100.0%	*P*	*US*	*E*	*D*	(1)
		Totals	287	290	99.2%					

Notes:
(1) Sample consisted of Business Unit within larger company

Company-type: P=production, manufacturing-oriented, S=service-oriented
Company-location: M=Malaysia, SA=South-Africa, US=United States
Company-profile, or 'life-cycle': S='starter' (< 5yrs) E= 'established' profile (> 5yrs)
Company-marketposition: D=Down-sizing

Table 5.7.
Summarized sampling characteristics of the Culture-related Data samples

Procedure; At all locations, the HF-2.01 questionnaire was handed out in a classroom-setting. The procedure as described in Chapter 5.5.1.1. was followed at all locations. The questionnaire was translated and made available both in English and in Bahassa Malaysia at the Malaysian facilities, with translations in English, Kosa and Afrikaans at the South African facilities.

Measures; Given a presumed hypothesis *H2B* a comparison was to be made between the components obtained through PCA from the Core Data sample and those obtained from the Culture-related Data samples in the assumption that comparable data would emerge[1].

For a definition of components obtained through PCA from the Core Data sample, reference is made to Chapter 5.6.1.1.

[1] Study 4 aims exclusively at a verification of hypothesis *H2B* where Culture-related Data from a sub-sample are assumed to produce same results as those obtained from the Core Data sample. Consequently, no additional comparisons are made of elementary components obtained from the sub-sample and clusters of items from the Model of Motivation.

Components from the three sets of samples comprising the Culture-related Data sample were obtained through PCA.

Analysis; The analysis was to proceed in two consecutive steps:

- An EFA, using PCA,
- and a Comparative analysis.

A description of the PCA is provided in Chapter 5.4.1.1., and was performed on the 83 variables comparable to those obtained from the Core Data sample using oblique rotation, with direct oblimin. No further variables were omitted as the analysis was solely aimed at a comparative analysis.

The comparative analysis was performed using several measures of comparison, as described in Chapter 5.4.1.2.

2. Results

Only the sample size of the US data did not meet fully with standards set earlier. A Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) was performed, ranging from .74 for the US data to .86 for the Malaysian data. For all samples a significant Bartlett's Test of Spherity ($p<.00001$) was obtained.

From the PCA 23 components emerged with eigenvalues above 1.0 for the Malaysian and South-African sample, 24 for the US data, explaining more than 65%, 68%, and 67% of the total variance in the respective data samples. An average communality after extraction was obtained of .66 for the Malaysian, .68 for the South-African and .67 for the US data samples. Inflexions of the scree plot justified isolating the first 3 components for the Malaysian, South-African and US samples, as indicated in Appendix XIV, Fig. A., B. and C., respectively[1].

Following the rationale as indicated in Chapter 5.4.1.1., a subsequent nonorthogonal rotation, using oblique rotation through direct oblimin, further reduced these components towards their essential attributes.

Appendix XV, Appendix XVI and Appendix XVII contain the 3 components for the Malaysian, South-African and US Data samples respectively, as they emerged after rotation, and their respective items with component loadings $\geq .400$ as obtained from the pattern matrix, together with the internal consistency reliability estimates for each component.

The comparative analysis between the elementary components DEDICAT and ACHIEV, obtained from the Core Data sample, and the components isolated in the three Culture-related Data samples, was performed according to criteria defined in Chapter 5.4.1.2., through parameters that appear in Table 5.8.

[1] No further distinctions were made in primary and secondary components.

Component Comparison	Overlap %	Sensitiv. %	Specific. %	Φ	Λ
(1)	(2)	(3)	(4)	(5) (6)	(7) (8)
Component DEDICAT					
1 Core Data versus Malaysian Data	75.0%	75.0%	100.0%	.855***	.714*
2 Core Data versus South-African Data	75.0%	75.0%	100.0%	.855***	.714*
3 Core Data versus US Data	87.5%	87.5%	98.7%	.862***	.750*
Component ACHIEV					
4 Core Data versus Malaysian Data	100.0%	100.0%	100.0%	1.000***	1.000*
5 Core Data versus South-African Data	100.0%	100.0%	100.0%	1.000***	1.000*
6 Core Data versus US Data	100.0%	100.0%	100.0%	1.000***	1.000*

Notes:
(1) Core Data Component DEDICAT consists of items ce, cf, cg, ci, cs, ct, dz and eb
Core Data Component ACHIEV consists of items at, au, av, ba, bb and bc
(2) Percentage overlap relative to Core Data sample
(3) Sensitivity is represented by the equation: TP/(TP + FN), where TP=True Positive Classification, FN=Fake Negative Classification. See Chapter 5.4.1.2 Comparative Analysis of Matrices
(4) Specificity is represented by the equation: TN/(FP + TN), where TN=True Negative Classification, FP=Fake Positive Classification. See Chapter 5.4.1.2 Comparative Analysis of Matrices
(5) Phi Coefficient
*(6) * p < .05, ** p < .01, *** p < .001*
(7) Guttman's Coefficient of Predictability Lambda
*(8) * p < .05, ** p < .01, *** p < .001*

Table 5.8.
Comparative Analysis Core Data sample and Culture-related Data;
Components DEDICAT and ACHIEV; Measures not meeting criteria are shaded.

A distinction is made in rows containing parameters for a comparison between the Core Data items as obtained for component DEDICAT and those for component ACHIEV. The data indicate there was a near complete match between component DEDICAT and a complete match between component ACHIEV and components that emerged from the PCA in all three samples. λ scores were significant at a $p<.05$ significance level, Φ scores at a $p<.001$.

Evaluating these results according to standards of Chapter 5.4.1.2., a principle outcome indicates support for hypothesis H2B, where it was assumed Culture-related Data would yield comparable components as those obtained from the Core Data sample.

3. Discussion

In parallel to earlier observations, limitations to the questionnaire, the resulting data-set and PCA extraction techniques, as well as sampling restrictions must be taken into account. In addition, it is stressed that besides the recurring components, other components emerged, especially after rotation for component DEDICAT, which were not accounted for in the Core Data results.

Nonetheless, the striking reoccurrence of components that were identified as being the essential constructs capturing Motivation within cultural settings that are traditionally considered as dramatically differing from one another, may open a discussion that these findings could suggest an unprecedented parallel in the way people are being motivated. Given the implications of such a conclusion, it is stated that future research is urgently needed to confirm and validate these outcomes.

4. Conclusion

The outcomes, then, of the second comparative analysis seem to provide support for hypothesis H2B, as formulated in Chapter 5.4.3., suggesting the concept of Motivation could be captured by components DEDICAT and ACHIEV, irrespective of socio-economic and cultural differences. These findings may suggest the Model of Motivation could provide a cross-cultural fundament for an inter-cultural understanding of the concept. Implications of these outcomes and observations justify elaborate subsequent research to further knowledge in this field.

5.6.3. Study 5: Company-related Data

A third and final analysis, then, will aim at a selection of so-called 'Company-related Data' aimed at a verification of H2C, with reference to Chapter 5.4.3.

1. Methodology

Sample; The Study was restricted to a selection of company-related characteristics as proposed in Chapter 5.4.2. Five sets of samples were taken from 18 companies that have been analyzed in the previous Studies 1 and 4[1]: A sample of Service-related companies, of Production-related companies, of so-called 'Starters' or companies having started operations within less than 18 months prior to the sampling date, versus so-called 'Established' companies that were operational for at least 5 years at the time of sampling, and finally, a sample of 'Downsizing' companies that were in a general status of reorganization for at least 6 months prior to the sampling date. To preserve an optimal distribution, sub-samples were to contain 3 to 4 unique companies, thus avoiding mutual overlap. Where sub-samples contained more than 4 companies, a random selection was made[2].

[1] Companies included in the Performance-related Data sample from Study 3 were not included to avoid bias as a result of the inherent selection of 'Higher-' and 'Lower Ranking Performers'.

[2] As a result, one company, Company XVIII was not contained in any sub-sample and therefore not included in the Company-related Data-set, thus bringing the total to 17 companies.

For a short description of participating companies reference is made to Appendix IV and Appendix X. An overview of samples is presented in Table 5.9.

Procedure; As indicated in Chapters 5.5.1.1. and 5.6.2.1., at all locations, the HF-2.01 questionnaire was handed out in a same classroom-setting, with the procedure as described in Chapter 5.5.1.1. followed at all locations.

Measures; Given a presumed hypothesis *H2C* a comparison was to be made between the components obtained through PCA from the Core Data sample and those obtained from these Company-related Data samples in the assumption that comparable data would emerge[1].

For a definition of components obtained through PCA from the Core Data sample, reference is made to Chapter 5.6.1.1.

Components from the Company-related Data samples were obtained through PCA.

Analysis; The analysis was to proceed along a same line of research as presented in Chapter 5.6.1.1. and Chapter 5.6.2.1.:

- An EFA, using PCA,
- a comparative analysis.

A description of the PCA is provided in Chapter 5.4.1.1. A PCA was performed on the same variables as those obtained previously in the Core Data sample using oblique rotation, with direct oblimin. No further variables were omitted as the analysis was solely aimed at a comparative analysis.

In the comparative analysis the procedure was followed as described in Chapter 5.4.1.2.

2. Results

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) in the five data-sets ranged from .87 for the sample of 'Starter' companies to .80 for the Service-oriented companies sample. For all samples a significant Bartlett's Test of Spherity ($p<.00001$) was obtained.

[1] Study 5 aims exclusively at a verification of hypothesis *H2C* where Company-related Data from a sub-sample are assumed to produce same results as those obtained from the Core Data sample. Consequently, no additional comparisons are made of elementary components obtained from the sub-sample and clusters of items from the Model of Motivation.

		Sampling date	n	N	Response	Company-type	Company-location	Company-profile	Company-marketpos.	
			Abs	Abs	%					
	Service									
1	*Company III*	*07-1998*	44	44	100.0%	*S*	*NL*	*E*		(1)
2	*Company VII*	*02-2000*	69	78	88.5%	*S*	*NL*	*E*		
3	*Company X*	*12-2003*	274	324	84.6%	*S*	*NL*	*E*		
		Totals	387	446	91.0%					
	Production									
4	*Company XIII*	*07-1997*	214	214	100.0%	*P*	*M*	*E*		(1)
5	*Company XVI*	*10-1998*	126	142	88.7%	*P*	*SA*	*E*		
6	*Company XV*	*01-1999*	140	140	100.0%	*P*	*M*	*E*		(1)
		Totals	480	496	96.2%					
	Starters									
7	*Company I*	*02-1997*	55	55	100.0%	*P*	*NL*	*S*		
8	*Company II*	*09-1997*	515	572	90.0%	*P*	*NL*	*S*		
9	*Company IV*	*01-1999*	99	113	87.6%	*P*	*NL*	*S*		
		Totals	669	740	92.5%					
	Established									
10	*Company VI*	*12-1999*	62	71	87.3%	*P*	*NL*	*E*		
11	*Company VIII*	*11-2000*	104	107	97.2%	*P*	*NL*	*E*		(1)
12	*Company XVII*	*10-1998*	131	140	93.6%	*P*	*SA*	*E*		
13	*Company XIX*	*06-1996*	171	174	98.3%	*S*	*US*	*E*		(1)
		Totals	468	492	94.1%					
	Downsizing									
14	*Company V*	*11-1999*	151	202	74.8%	*P*	*NL*	*E*	*D*	(1)
15	*Company IX*	*02-2002*	176	176	100.0%	*P*	*NL*	*E*	*D*	(1)
16	*Company XIV*	*07-1997*	159	159	100.0%	*P*	*M*	*E*	*D*	(1)
17	*Company XX*	*04-2002*	116	116	100.0%	*P*	*US*	*E*	*D*	(1)
		Totals	602	653	93.7%					

Notes:
(1) Sample consisted of Business Unit within larger company

Company-type: P=production, manufacturing-oriented, S=service-oriented
Company-location: M=Malaysia, SA=South-Africa, US=United States
Company-profile, or 'life-cycle': S='starter' (< 5yrs) E= 'established' profile (> 5yrs)
Company-marketposition: D=Down-sizing

Table 5.9.
Summarized sampling characteristics of the Company-related Data samples

From the PCA 25 components emerged with eigenvalues above 1.0 for the Service-oriented companies sample explaining 68% of total variance, 24 for the Production-oriented companies sample, also explaining 68% of total variance, 22 for the sample of 'Starter' companies, 21 for the sample of 'Downsizing' companies, both explaining 63% of total variance and 23 components for the sample of 'Established' companies explaining 65% of total variance in the sample. The average communality obtained after extraction ranged from .63 for the sample of 'Starter' companies and the sample of 'Downsizing' companies, to .68 for both the Service- and Production-oriented companies samples. For the Production-oriented companies

sample, the sample of 'Starter' companies and the sample of 'Downsizing' companies, the inflexions of the scree plot justified isolating the first 3 components, and for both remaining samples, the first 4 components, as indicated in Appendix XVIII, Fig. B., C., E and A, D, respectively[1].

Referring to the rationale indicated in Chapter 5.4.1.1., a subsequent nonorthogonal rotation, using oblique rotation through direct oblimin, further reduced these components towards their essential attributes.

In five Appendices a report is provided of the components that emerged after rotation, visualizing the items with component loadings $\geq$.400 as obtained from the pattern matrix, together with the internal consistency reliability estimates for each component. Appendix XIX contains the PCA for the Service-oriented companies sample, Appendix XX the PCA for the Production-oriented companies sample, Appendix XXI the PCA for the sample of 'Starter' companies, Appendix XXII the sample of 'Established' companies, and, finally, Appendix XXIII the sample of 'Downsizing' companies.

The parameters reported in Table 5.10 provide the basis for the comparative analysis between the elementary components DEDICAT and ACHIEV obtained from the Core Data sample, and the components isolated in the five Company-related Data samples, as performed according to criteria defined in Chapter 5.4.1.2.

It appears that, as with the Culture-related Data samples, the Company-related Data samples provided a near perfect match between component DEDICAT as emerged from the Core Data sample and components that emerged from the PCA in all five samples. Φ scores were significant at $p<.001$, λ scores nearly all at a $p<.05$. A comparison between component ACHIEV as it emerged from the Core Data-set and components from the Company-related Data samples yielded comparable results with the exception of the Service-oriented companies sample.

Again, evaluating these results according to the standards proposed in Chapter 5.4.1.2., a principle outcome for the Company-related Data samples would support hypothesis H2C, where it was assumed that a selection of Company-related Data would yield comparable components as those obtained from the Core Data sample. An exception, however, was found in the Service-oriented companies Data sample, that failed to compare adequately to component ACHIEV.

[1] As in the previous study, no further distinctions were made in primary and secondary components.

	Component Comparison	Overlap	Sensitiv.	Specific.	Φ	Λ
		%	%	%		
	(1) (2)	(3)	(4)	(5)	(6) (7)	(8) (9)
	Component DEDICAT					
1	Core Data vs Type-related Data (Service)	75.0%	75.0%	98.7%	.782***	.600
2	Core Data vs Type-related Data (Production)	87.5%	87.5%	100.0%	.929***	.867*
3	Core Data vs Profile-related Data (Starters)	100.0%	100.0%	100.0%	1.000***	1.000**
4	Core Data vs Profile-related Data (Establ.)	100.0%	100.0%	98.7%	.937***	.882**
5	Core Data vs Market-related Data (Downs.)	87.5%	87.5%	100.0%	.929***	.867*
	Component ACHIEV					
6	Core Data vs Type-related Data (Service)	66.7%	66.7%	100.0%	.806***	.600
7	Core Data vs Type-related Data (Production)	100.0%	100.0%	100.0%	1.000***	1.000*
8	Core Data vs Profile-related Data (Starters)	83.3%	83.3%	100.0%	.907***	.818*
9	Core Data vs Profile-related Data (Establ.)	100.0%	100.0%	100.0%	1.000***	1.000*
10	Core Data vs Market-related Data (Downs.)	100.0%	100.0%	100.0%	1.000***	1.000*

Notes:
(1) Core Data Component DEDICAT consists of items ce, cf, cg, ci, cs, ct, dz and eb
Core Data Component ACHIEV consists of items at, au, av, ba, bb and bc
(2) Service=Service-oriented companies, Production=Production-oriented companies, Starter=Starting companies, Establ.=Established companies, Downs.=Downsizing companies
(3) Percentage overlap relative to Core Data sample
(4) Sensitivity is represented by the equation: TP/(TP + FN), where TP=True Positive Classification, FN=Fake Negative Classification. See Chapter 5.4.1.2 Comparative Analysis of Matrices, note 3
(5) Specificity is represented by the equation: TN/(FP + TN), where TN=True Negative Classification, FP=Fake Positive Classification. See Chapter 5.4.1.2 Comparative Analysis of Matrices, note 3
(6) Phi Coefficient
*(7) * p < .05, ** p < .01, *** p < .001*
(8) Guttman's Coefficient of Predictability Lambda
*(9) * p < .05, ** p < .01, *** p < .001*

Table 5.10.
Comparative Analysis Core Data sample and Company-related Data;
Components DEDICAT and ACHIEV; Measures not meeting criteria are shaded.

3. Discussion

Limitations to the questionnaire, the resulting data-set and PCA extraction techniques were mentioned earlier especially in Chapter 5.5.1.3. In addition, however, it is stressed that to avoid excessive data sampling, the subset was generated from available samples. Reoccurrence of components could have originated from this reallocation, although special attention was given to diversify samples, and samples were made to adequately represent company-related characteristics.

Furthermore, only a limited number of company-related characteristics have been observed. Future research must include a wide variety of characteristics with observations in a diverse range of company settings.

In addition to these restrictions, again, it is noted that as the research was primarily focused on a business related environment, no further sample characteristics, e.g. gender, age, socio-economic background, were observed. It is suggested that future research will include those parameters as an additional verification of findings.

4. Conclusion

In a comparative analysis, a selection was made of company-related characteristics in the assumption that results would be comparable for all characteristics, as mentioned in Chapter5.4.2. Outcomes of this third analysis follow a same pattern as previous conclusions and provide support for hypothesis H2C, as formulated in Chapter 5.4.3., that the concept of Motivation seems to be captured by components DEDICAT and ACHIEV, irrespective of company-related differences.

5.6.4. *Conclusions*

Given the assumption that the Process of Motivation as captured by the Model, has a general stature and is therefore applicable within any given population, it was hypothesized that the outcomes of a series of three additional representative samples would yield comparable results to those obtained from the Core Data sample, where components DEDICAT and ACHIEV were isolated as being the elementary constructs capturing the Process of Motivation.

In a first comparative analysis, Chapter 5.6.1., it was found that results provided only partial support for hypothesis H2A, as formulated in Chapter 5.4.3., where it was assumed that the components obtained from the Performance-related Data sample would yield comparable items as those obtained from the Core Data sample.

A second comparative analysis, Chapter 5.6.2., provided substantial evidence for hypothesis H2B, formulated Chapter 5.4.3., where it was assumed that components obtained from a selection of Culture-related Data from three different locations world-wide would yield comparable items as those obtained from the Core Data sample. Findings suggested the Model of Motivation could provide a cross-cultural fundament for an inter-cultural understanding of the concept.

Outcomes of a third analysis, Chapter 5.6.3., followed a same pattern as previous conclusions and provided substantial evidence for hypothesis H2C, Chapter 5.4.3., where it was assumed that components obtained from a Company-related Data sample would yield comparable results as those obtained from the Core Data sample.

Given hypotheses H2A, H2B and H2C have been substantially met, it is assumed, following Chapter 5.4.3., that the concept of Motivation has been adequately captured, and from the analysis the elementary constructs from the Model have emerged that represent the Process of Motivation, as indicated by our Problem Statement, Chapter 2.5.

These conclusions justify an additional and final study as initially proposed in Chapter 5.4.3. where it was suggested, following a confirmation of hypotheses, that a further reduction would be justified into distinct factor scores for each relevant component, thus enabling a quantification of the concept of Motivation for subsequent research..

5.7. Empirical Research
Factor Scoring

5.7.1. Study 6: Core Data Generated Factor Scores

Factor scores reflect and capture in a single score the outcomes of the rotation process in terms of the components that were generated. Factor scores can be used in the subsequent analyses to represent the values of the components, i.e. components DEDICAT and ACHIEV, which were found to represent the Process of Motivation as its elementary constructs. Thus, assigning a factor score per subject for the components DEDICAT and ACHIEV, provides a means to quantify and capture Motivation for each individual subject, enabling a further analysis of Conditions affecting Motivation in Chapter 6, and indirectly of Competencies initiating these Conditions in Chapter 7 and Instruments assisting in evoking these critical Determinants in Chapter 8.

The sixth and final Study in this Chapter, then, is aimed at defining a suitable course of action in generating the factor scores in these subsequent analyses.

1. Methodology

In capturing Motivation through factor scores, a number of considerations are to be taken into account.

As indicated Chapter 5.4.1.3., to avoid the influences of differences in scales of measurement used on the items in the questionnaire, factor score coefficients are used rather than factor loadings as weights in the final equations generating the factor scores. The specific combination of factor score coefficients are used as weights to provide for each item a score quantifying its specific contribution on the final component. Each component has its specific signature reflected in this series of factor score coefficients per item. As such, computing a factor score with these ingredients captures the essence of the component it represents.

Given the outcomes of the study where components DEDICAT and ACHIEV emerge as being the elementary components capturing Motivation, *both components are to express Motivation in a two-fold score. As a consequence, in empirical research in Chapters 6, 7 and 8, a distinction will be made in both factor scores in the various analyses.*

Finally, in the stepwise approximation of factor scores towards a final score, a number of considerations are to be made in the extrapolation of factor scores from the ones obtained from the Core Data sample towards a given sample.

Factor scores are calculated in three steps:

- *Missing values replacement by mean estimates;* As all items are involved in setting up a factor score, missing items affect the outcomes of a final score. When factor scores are required for each subject in a sample, the usual procedure is two-fold:

- Either to replace missing values by the mean of the specific sample,
- ... or to replace missing values by the mean of the entire series, i.e. Core Data and specific sample. *The subsequent empirical research will follow the option of the series mean, i.e. Core Data and specific sample, instead of only the sample mean to avoid irregularities especially in smaller samples.*

- *Z scores;* In order to avoid the influences of differences in scales of measurement used on the items in the questionnaire Z scores are used. Two options in deriving the z score:
  - Either using the specific sample mean,
  - ... or to use the mean of the entire series, i.e. a summative series of Core Data and specific sample[1]. *The subsequent empirical research will make use of a mean from a summative data-set consisting of Core Data and specific sample, to avoid detrimental effects of generating z scores based on highly divergent data especially in small samples, and to provide an adequate basis for correctly expressing divergence in data as related to their respective factor score coefficients.*
- *Factor scores;* Factor score coefficients are used as weights in the final equations. Two options emerge in practice:
  - Usually, the current practice of using a general data-set together with a specific sample in replacing missing values and generating z scores, also leads to having factor scores being generated by the combined data-sets. This, however, affects the integrity of the factor score coefficients, as these are also influenced by the scores from the specific sample, especially when this added sample tends to be large.
  - *In order to preserve the integrity of the factor score coefficients generated by the Core Data sample, subsequent empirical research will only use the coefficients as generated by the Core Data sample, and will compute factor scores for the specific data samples based on these original factor score coefficients*[2].

[1] Arguably, the option to use a Core Data generated mean instead of a summative series of Core Data and specific sample mean would be more suitable in computing a factor score. The option, however, seems not available on current statistical software.

[2] Factor scores will be generated using a standard procedural SPSS computation. It is noted however, that, as a result, factor scores will be generated on all items, whereas, preferably, a choice should be made whether to include only the items clustered *and mentioned* in both components DEDICAT and ACHIEV as weights in the equations, or to include also the coefficients of remaining items. A choice to include all items is considered correct as it provides an optimal expression of the underlying dimension captured in both components, with substantial weight given to the specific items mentioned for both components. Moreover, as a selection of these items is dependent on criteria used earlier to interpret only items with factor loadings greater than .40, these criteria would indirectly affect a factor score selection. To avoid a possible divergence in rationale behind an adequate choice in constituting component items and an adequate representation by means of factor scores, no further item selection is made and all items are included in a final factor score computation.

2. Discussion

Factor score coefficients, then, are generated using the Core Data sample as a 'blue-print' for other samples to compile and express Motivation from, in a two-fold score.

A number of closing observations must be made prior to applying these factor scores to the data in the different studies.

First, in replacing missing values, and in defining z scores, specific samples will be analyzed in conjunction to the Core Data sample, in a summative data-set. In defining the final factor scores, the factor score coefficients as generated from the Core Data sample will be used, resulting in a factor score that preserves the original signature of the Data-set that was found to have captured the Process of Motivation in its elementary concepts, as suggested by the subsequent studies.

Second, as the factor scores are generated from factor score coefficients, and standardization of scores leads to negative and positive values in resulting scores, in coming analyses the factor scores may lead to scores that may not follow an intuitive positive to negative, but rather a negative to positive profile, in reflecting a progressive course, especially when, in Chapter 8, results are being visualized.

And third, as the sample size affects the resulting factor scores when Core Data and specific samples are merged in the computation process, a specific sample size is to be restricted in accordance with the sample size of the Core Data sample.

5.7.2. *Conclusions*

The process of Motivation has been captured in its elementary components DEDICAT and ACHIEV, which were found to reflect the two most important Phases in the Model of Motivation as described in Chapter 3.3.4.

Both components will be represented in their respective factor scores, enabling a quantification of the concept of Motivation.

Factor scores are to be computed in three consecutive steps:

- *Missing values; Empirical research will follow the option to replace missing values by the mean of the entire series, i.e. Core Data and research sample.*
- *Z scores; Empirical research will make use of Z scores derived from the mean from the summative data-set consisting of Core Data and research sample.*
- *Factor scores; In order to preserve the integrity of the factor score coefficients generated by the Core Data sample, empirical research will only use the coefficients as generated by the Core Data sample, and will compute factor scores for the specific data samples based on these original factor score coefficients.*

5.8. Summary

Motivation in its essential form was found in Chapter 3.3.4. to be represented by Phases 3 and 8 in the Model of Motivation. Chapter 5 was to provide evidence of elementary constructs from the Model, in terms of components and their respective items, capturing the Process of Motivation. In matching elements obtained in a statistical reduction of the data-set with those suggested by the Model, empirical evidence would be obtained in support of the Model of Motivation.

The analysis in Chapter 5 has progressed along two successive lines. The first line consisted of a Data Reduction in Study 1, Chapter 5.5.1. aimed at providing evidence of elementary constructs, that captured the Process of Motivation in its essence, while preserving its original signature. The Model of Motivation, in its distinct Phases, was operationalized through a questionnaire HF-2.01, consisting initially of 93 questions. Data reduction on the data-set was obtained through Principal Component Analysis (PCA), resulting in 83 remaining items. In the extraction phase of the analysis, the data-set of questions was limited to components with highest eigenvalues, designated as 'initial components', accounting for a substantial variance and thus providing an adequate description of the data-set. In a subsequent non-orthogonal rotation phase these extracted initial components were further reduced towards components that were considered to be a reduced reflection of the original initial components. These resulting components were designated as 'elementary components', which, through rotation, were considered to have preserved their original signature, as rotation has the effect of optimizing the underlying component structure.

In a second line, Study 2, Chapter 5.5.2., a Model Comparison was performed. Isolated components were compared through analysis to the essential Phases of the Model of Motivation, Phases 3 and 8, as proposed in Chapter 3.3.4. A perfect match was obtained between two primary components, designated as 'DEDICAT" and 'ACHIEV', yielding significance levels as expressed in both Phi and Lambda coefficients.

It was assumed that the Model of Motivation would be universally applicable and that differences in performance-, or culture-, or specific company-related characteristics would yield a same set of components, within limitations set to sampling within a quasi-experimental setting. A first comparative analysis, Study 3, Chapter 5.6.1., on so-called 'Performance-related Data' provided only partial support for these assumptions. A second comparative analysis, Study 4, Chapter 5.6.2., on 'Culture-related Data' from three different locations world-wide, provided substantial evidence in support of these assumptions, suggesting the Model of Motivation could provide a cross-cultural fundament for an inter-cultural understanding of the concept. A third analysis in Study 5, Chapter 5.6.3. performed on 'Company-related Data' produced comparable results.

Following the Problem Statement defined in Chapter 2.5., the empirical research provided evidence, then, that components DEDICAT and ACHIEV as obtained from the analysis, were indicative of Phases 3 and 8 of the Model of Motivation, and were the elementary constructs that capture the Process of Motivation, thus providing first empirical evidence in support of the Model of Motivation.