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Developing a measure of competitive advantage

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Abstract

Purpose – The purpose of this paper is to attempt to develop a measure of competitive advantage by identifying a stipulative definition, composing an operational definition and constructing a measurement variable.

Design/methodology/approach – The paper undertakes critical literature review, cognitive interviews as well as a pilot and full study, which were carried out by applying a cross-sectional, self-administered e-mail survey with questionnaire in a fillable text-processing file, in order to develop a valid and reliable measure of competitive advantage.

Findings – The results have led to the identification of a conceptually robust stipulative definition, the composition of a comprehensive operational definition and the construction of a qualified variable, making the development of a valid and reliable measure of competitive advantage possible.

Research limitations/implications – The newly developed measure of competitive advantage, exempt from past conceptual problems, could be used for valid measurements in future empirical studies in the field of strategic management. At the same time, authors encourage future tests of the newly developed measure's reliability and validity.

Practical implications – The provision of a conceptually clear stipulating definition and a comprehensive operational definition for competitive advantage could increase practicing managers' awareness relating to the conceptual nature as well as the latent expressions of competitive advantage.

Originality/value – The findings contribute to the evolution of the strategic management field by providing a valid and reliable measure of competitive advantage that is applicable under any leading theoretical perspective in strategic management and it could better serve the needs of both empirical research and management practice.

Keywords Competitive advantage construct, Competitive advantage variable, Measure development, Measure of competitive advantage, Operational definition of competitive advantage, Stipulative definition of competitive advantage

Paper type Research paper

1. Introduction

Although the literature in the field of strategic management has extensively identified the sources or determinants of competitive advantage (Caves and Porter, 1977; Miles and Snow, 1978; Porter, 1980; Lippman and Rumelt, 1982; Wernerfelt, 1984; Porter, 1985; Barney, 1986a; Winter, 1987; Dierickx and Cool, 1989; Barney, 1991; Peteraf, 1993; Teece *et al.*, 1997; Eisenhardt and Martin, 2000; O'Regan and Ghobadian, 2004), surprisingly it does not provide any clear definition of competitive advantage (Ma, 2000; Arend, 2003; Rumelt, 2003; Foss and Knudsen, 2003; O'Shannassy, 2008; Sigalas and Pekka Economou, 2013).

In their recent review of the literature regarding the use of competitive advantage term, Sigalas and Pekka Economou (2013) found that there are multiple meanings of competitive advantage and there is no agreement on a single conceptually clear and unambiguous definition. In particular, Sigalas and Pekka Economou (2013) argue that apart from few definitions in the literature that define competitive advantage in

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a rather fuzzy manner (see e.g. South, 1981), all other statements, which implicitly define competitive advantage, can be classified into two main streams. The first stream defines competitive advantage in terms of performance (see Thomas, 1986; Schoemaker, 1990; Ghemawat, 1991; Winter, 1995; Grant, 1998; Besanko *et al.*, 2000; Foss and Knudsen, 2003; Grahovac and Miller, 2009) whereas the second stream defines competitive advantage in terms of its sources or determinants (see Ansoff, 1965; Porter, 1985; Powell, 2002; Wiggins and Ruefli, 2002). Hence, even though statements about competitive advantage abound in literature, its conceptually precise definition is elusive (Ma, 2000; Rumelt, 2003; Arend, 2003; O'Shannassy, 2008), an issue that has been classified as the "definitional problem of competitive advantage" (Sigalas and Pekka Economou, 2013, p. 63). In view of the fact that the strategic management field, since its inception, has been lacking a clear theoretical definition of competitive advantage (Rumelt, 2003), its operational definition is also obscure (Ma, 2000).

The poor theoretical definition, or stipulative definition, and operational definition of competitive advantage, lead to its poor operationalization which, according to Popper's (1959) statements, stalls theory from being scientific, falsifiable and truth seeking. Thus, more work on developing a measure, or on operationalization, of competitive advantage is required before strong empirical tests are possible. However, prior to the development of a reliable and valid measure of competitive advantage, scholars have to identify a conceptually robust stipulative definition and to compose a comprehensive operational definition of competitive advantage (Sigalas and Pekka Economou, 2013). One simply cannot acknowledge an inefficient or even wrong stipulative definition of a concept that would lead to a misstated operational definition and then proceed to empirical research using the derivative measure without being in danger of building a theory on rotten foundations. Before scholars are able to do so, competitive advantage will remain a heavily loaded concept used mainly for convenience but without theoretical meaning and empirical content (Ma, 2000; Arend, 2003).

Therefore, the field of strategic management is in need of a valid and reliable measure of competitive advantage that will be grounded on a comprehensive operational definition which in turn has to be based on a conceptually robust stipulative definition. Otherwise it needs to stop employing a concept that cannot be defined and operationalized (Arend, 2003). This paper intends to respond to literature's call for developing a measure of competitive advantage, based on a clear and comprehensive stipulative and operational definition (Sigalas and Pekka Economou, 2013), that can be used in empirical studies.

2. Methodology

Due to its definitional problem, competitive advantage has raised logical and philosophical considerations to scholars in the strategic management field. Powell (2001, 2002, 2003) was one of the first scholars who provoked debate relating to the philosophical foundations of competitive advantage's research. In particular, Powell (2001) mentions that the competitive advantage hypotheses are tautologous and, hence, of little scientific value because they are true by definition and not falsifiable. Nevertheless, Powell (2001) argues that there remains some value in the research stream, if scholars adopt the pragmatic view as philosophy of science. On the other hand, some scholars have argued that there is no necessity to adopt Powell's pragmatic view of competitive advantage, and there is room for more positivist research on the relationships between competitive advantage and performance (Durand, 2002; Arend, 2003). We follow the positivist stream because we believe that the meaning attributed to competitive advantage can, in fact, generate or resolve the problems and fallacies

arising from its conceptualization that have been identified by literature (see Sigalas and Pekka Economou, 2013).

Before developing a measure for competitive advantage, we should point out the process that needs to take place. As can be seen in Figure 1, the first step is the identification of a robust stipulative definition for the concept of competitive advantage in line with Sigalas and Pekka Economou's (2013) criterion 1, i.e. to incorporate all the latent characteristics of the concept and criterion 2, i.e. not to contain any judgments about its own value or firm's performance. The identification of a robust stipulative definition was carried out by critical literature review in the field of strategic management. The articles that offer a stipulative definition for competitive advantage were obtained by conducting a keyword search of ABI/Inform, ProQuest, Scopus, Business Source Premier (EBSCO) and JSTOR using the keyword "competitive advantage." We used 1965 as the starting date for the search because in the early work of Ansoff (1965), the concept of competitive advantage first appeared in the strategy literature (Wiggins and Ruefli, 2002).

The second step, which is the composition of a comprehensive operational definition of competitive advantage, was performed by conducting cognitive interviews, in line with Dillman's *et al.* (2009) guidelines, with six practitioners from six companies incorporated in Greece. The cognitive interviews had taken place from May 5, 2010 until May 26, 2010. The practitioners who participated in the interview were all senior-level executives, who are heavily involved in the strategic management process of their firms. The companies were randomly selected from the population list. Population includes those companies that are incorporated in Greece and the last three years reported revenue higher or equal to ten million euros.

Furthermore, the third step is the construction of a qualified variable for competitive advantage, which can support valid and reliable measurements. The construction of a variable for competitive advantage was based on the construction of a variable for firm competitiveness. For the construction of firm competitiveness variable, we have followed the levels of measurement classification as proposed by Trochim (2000, 2006).

The fourth step, which is the purification of the newly developed measure of firm competitiveness and thus of the competitive advantage, was achieved by the results of a pilot study. The pilot study was administered to a random sample of 130 firms, drawn from the population list, from July 2010 to November 2010. The pilot study was carried out in the form of a cross-sectional self-administered e-mail survey using a

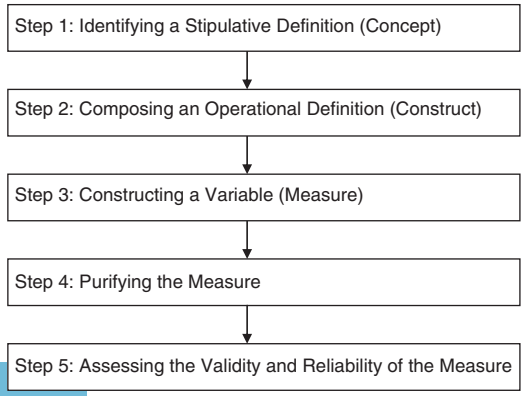

Figure 1.
Development process of competitive advantage measure

questionnaire approach following the Dillman *et al.*'s (2009) tailored design method. The pilot survey resulted in 25 completed questionnaires, reflecting a response rate of 19.2 percent. The response rate of the pilot survey compares favorably with similar studies in the field of strategic management (Newbert, 2008). The respondents who participated in the pilot study were all senior-level executives, i.e. CEOs and CFOs.

Finally, the fifth step, which is the assessment of validity and reliability of the newly developed measure of firm competitiveness, and consequently of competitive advantage, was performed by using the data of a full study. In particular, following Dillman *et al.*'s (2009) tailored design method, the full study was carried out with a cross-sectional, self-administered e-mail survey with questionnaire in fillable text-processing file. The questionnaire along with a cover letter were sent out in a series of e-mails from December 2010 to May 2011 to all population members, 2,033 in total, as were identified by the sampling frame drawn from Hellastat database, turning the survey into census. The cover letter described the target of the survey, which was to investigate the competitiveness of companies in the current turbulent economic conditions in Greece, in order to motivate respondents to participate as per common practice (Julian and Ofori-Dankwa, 2008; Dillman *et al.*, 2009). From these 2,033 respondents, 268 usable completed questionnaires were received, reflecting an adjusted response rate of 18.1 percent, a response rate that compares favorably with similar studies in the field of strategic management (see Powell, 1992; Spanos and Lioukas, 2001; Gunn and Williams, 2007; Hmieleski and Baron, 2008). Pursuant to previous studies, the response rate was adjusted for defunct and missing e-mail addresses (see Doving and Gooderham, 2008). As in the pilot study, the respondents who participated in the full study were all senior-level executives, i.e. CEOs and CFOs, who are heavily involved in the strategic management process of their firms.

3. Identifying a stipulative definition for competitive advantage

By accessing the strategic management literature we have managed to identify only two clear stipulative definitions of competitive advantage that seemingly do not contain any judgments about their own value or firm's performance. The above result, apart from rendering the task of providing a stipulative definition in line with the two criteria extremely difficult, also depicts the extent of the definitional problem of competitive advantage (Sigalas and Pekka Economou, 2013).

Using chronological order, the first clear stipulative definition of competitive advantage was introduced by Peteraf and Barney (2003). According to them "An enterprise has a competitive advantage if it is able to create more economic value than the marginal (breakeven) competitor in its product market" (Peteraf and Barney, 2003, p. 314). Peteraf and Barney (2003) argue that their definition is consistent with the usage of competitive advantage by resource-based view of Barney (1986a, 1991) and by the market-led perspective of Porter (1985). Nevertheless, its precise meaning heavily depends upon a clear definition of the concept of "economic value." Peteraf and Barney (2003, p. 314) define economic value as the value "created by an enterprise in the course of providing a good or service (that) is the difference between the perceived benefits gained by the purchasers of the good and the economic cost to the enterprise."

In a nutshell, according to Peteraf and Barney (2003), a firm that has attained a competitive advantage has created more economic value – which is the difference between the customer's perceived benefit from product or service and the economic cost in order to produce the product or provide the service – compared to its

competitors. Thus, according to Peteraf and Barney (2003) the stipulative definition of competitive advantage is:

> […] the capability of a firm to create more economic value than the least efficient competitors.

The stipulative definition of competitive advantage as provided by Peteraf and Barney (2003) is argued to be clear and rigorously stated, thus it meets the first criterion of a conceptually robust stipulative definition. But it seems that it does not fulfill the second criterion of an adequate and robust stipulative definition, which is not to contain any antecedents of performance. Although, Peteraf and Barney (2003) do not define competitive advantage in terms of financial profitability such as profits, ROA, etc., their stipulative definition does not avoid the tendency of containing judgments about its own value since it defines competitive advantage in terms of economic value. In particular, when competitive advantage is defined as the capability of a firm to create more economic value than the least efficient competitors, then in reality the meaning appointed is closely related to its outcome in terms of economic value. However, we should mention that the terms "economic performance" (Wiggins and Ruefli, 2002, 2005), "profit," "rent," "value" and "firm performance" (Bosse *et al.*, 2009) are often used to indicate the concept of performance in strategic management. Consequently, Peteraf and Barney's (2003) stipulative definition of competitive advantage cannot be accepted.

The second clear stipulative definition of competitive advantage that has been traced in the strategic management literature was provided by Newbert (2008). Newbert's (2008) stipulative definition was based on Barney's (1991) statements regarding competitive advantage. According to Newbert (2008, p. 752), competitive advantage is "the degree to which a firm has exploited opportunities, neutralized threats and reduced costs." We should mention that the degree to which a firm has exploited opportunities, neutralized threats and reduced costs, according to our understanding, does not represent competitive advantage but rather the degree of firm competitiveness. Several scholars have argued that competitive advantage is in fact a relational term and for that reason in order to be defined, its expressions, or dimensions, or characteristics must be compared with those of the firm's competitors. In support, Ma (2000, pp. 17-18) mentions that "competitive advantage is a relational term. It is essentially a comparison drawn between a focal firm and its rival(s) on certain dimension(s) of concern in competition." In addition, Arend (2003, p. 280) states that "[…] noting that the term competitive advantage includes the word competitive, it may be argued that the term has a relative basis, specifically relative to rivals." Moreover, Peteraf and Barney (2003, p. 320) state that "competitive advantage is a relative term and therefore requires an exogenous basis for comparison."

Therefore, the aforementioned statement of Newbert (2008), namely "the degree to which a firm has exploited opportunities, neutralized threats and reduced costs" is not the stipulative definition of competitive advantage but the stipulative definition of firm competitiveness, or in other terms the degree of firm competitiveness. In order to advance to the stipulative definition of competitive advantage the dimensions of firm competitiveness, as they have been identified by Newbert (2008), have to be compared with those of comparable competitors within an industry. Therefore, paraphrasing and enhancing Newbert's definition, the stipulative definition of competitive advantage can be crafted as:

> […] the above industry average manifested exploitation of market opportunities, neutralization of competitive threats and reduction of costs.

The above stipulative definition satisfies the first criterion of a clear and conceptually precise definition along with the second one since it differentiates competitive advantage from superior performance. All three latent dimensions of competitive advantage are not

necessarily associated with performance let alone superior performance. Although exploitation of opportunities and/or neutralization of threats and/or reduction of cost may lead to improved or even superior performance, this is not always the case. In support, even when a firm has effectively developed a competitive advantage, it may find itself with an expenditure incurred to develop the competitive advantage that is higher compared to the benefits that stem from competitive advantage (Coyne, 1986).

The stipulated definition of competitive advantage, as has been refined and enhanced, can be accepted as a rigorous and conceptually robust theoretical definition for competitive advantage that can be served as a basis for the development of its thorough operational definition.

4. Composing an operational definition for competitive advantage

After having established a robust stipulative definition for competitive advantage construct, the second step of its measure development process is to compose its comprehensive operational definition. Given that firm competitiveness and competitive advantage (i.e. the above industry average firm competitiveness), like all unobservable constructs, are inherently complicated (Godfrey and Hill, 1995) their operational definition was diligently created in consultation with senior management executives that participate in the strategic management process of their firms, during the cognitive interviews.

In the first step of the cognitive interviews, the selected stipulative definition of competitive advantage was provided and reviewed by the executives in order to ensure their clarity and relevance to non-academics. Afterwards, they were asked to elaborate further on the provided definition in order to include significant manifestations or latent expressions that are not present in the selected stipulative definition. The feedback from the executives led to the enhancement of competitive advantage's first dimension, namely exploitation of market opportunities, to the following aspects:

(1) exploitation of all market opportunities;

(2) full exploitation of market opportunities; and

(3) exploitation of more market opportunities than competitors.

The second dimension of competitive advantage, namely neutralization of competitive threats, was enhanced to the following aspects:

(1) neutralization of all competitive threats;

(2) full neutralization of all competitive threats; and

(3) neutralization of more competitive threats than competitors.

The third dimension of competitive advantage, namely and reduction of costs, was enhanced to the following aspects:

(1) reduction of total expenses at higher rate than competitors;

(2) reduction of operating expenses at a higher rate than competitors;

(3) reduction of total expenses divided by revenue to a higher extent than competitors; and

(4) reduction of operating expenses divided by revenue to a higher extent than competitors.

All the above aspects of the three dimensions of competitive advantage, as proposed by senior managers, should be included in the operational definition of both firm

competitiveness and competitive advantage. Therefore, the operational definition of firm competitiveness can be expressed as follows:

> The degree to which a firm has
> exploited:
> a) all market opportunities, b) the market opportunities fully and c) more market opportunities than competitors,
> neutralized:
> a) all competitive threats, b) the competitive threats fully and c) more competitive threats than competitors
> and reduced:
> a) total expenses at a higher rate than competitors, b) operating expenses at a higher rate than competitors, c) total expenses divided by revenue to a higher extent than competitors and d) operating expenses divided by revenue to a higher extent than competitors.

Likewise, the operational definition of competitive advantage can be expressed as follows:

> The above industry average manifested:
> exploitation of:
> a) all market opportunities, b) full (exploitation of) the market opportunities and c) more market opportunities than competitors,
> neutralization of:
> a) all competitive threats, b) full (neutralization of) the competitive threats and c) more competitive threats than competitors
> and reduction of:
> a) total expenses at a higher rate than competitors, b) operating expenses at a higher rate than competitors, c) total expenses divided by revenue to a higher extent than competitors and d) operating expenses divided by revenue to a higher extent than competitors.

5. Constructing a variable for competitive advantage

The third step of competitive advantage's measure development process, after finding a conceptually robust stipulative definition and developing a comprehensive operational definition, is the construction of a qualified variable for competitive advantage which can support valid and reliable measurements.

The variable for measuring competitive advantage will be constructed from the variable of firm competitiveness. Thus, first we need to construct a variable for firm competitiveness and then we can create a variable of competitive advantage by comparing each firm competitiveness with the average competeveness of its industry, which is the arithmetic mean of all firms' competitiveness that belong to a specific industry. Thus, based on levels of measurement classification as proposed by Trochim (2000, 2006), the variable will be the firm competitiveness, or the degree of firm competitiveness. The attributes of the variable will be ten in number, equal to the total aspects of the three dimensions of the firm competitiveness as derived from its operational definition. The values of the attributes depend on whether the attributes are measured by scales or indices. Firm competitiveness is an unobservable construct (Godfrey and Hill, 1995) and for that reason its measurement will be carried out by a latent variable. Latent variables, on the other hand, can be classified into two categories, i.e. reflective and formative variables (Diamantopoulos and Siguaw, 2006; Diamantopoulos *et al.*, 2008). Since the expressions, or dimensions, or manifestations, of firm competeveness are being affected by firm competitiveness and not vice versa, the variable of firm competitiveness should be reflected in its attributes.

The values of the attributes, as a result of the reflective nature of firm competitiveness variable, will be based on scales. The specific type of scale that was

selected is the five-point Likert scale, since it has been used in similar efforts to operationalize competitive advantage in the past (see Newbert, 2008) with satisfactory level of dispersion around mean value. All the levels of measurement of firm competitiveness variable are presented in Figure 2.

The selected variable of firm competitiveness, like every other unobservable construct, needs to have observable attributes or items, which can ascribe all its latent expressions in order to be able to measure it. For that reason, we operationalized the items of the variable of firm competitiveness, and subsequently of competitive advantage, based on senior managers' perceptions, thus making the measure of firm competitiveness a perceptual or subjective one. The items of a firm competitiveness variable will be positively coded, such that the higher the response, the greater the firm competitiveness. The variable will not be constructed from the sum or the average of the responses' scores to these ten items, as it is often found in literature (see Spanos and Lioukas, 2001; Zahra and Nielsen, 2002; Newbert, 2008), but from the components scores of principal component analysis in order to factor in the different weigh of each item to the overall variable.

The variable of competitive advantage, on the other hand, will be derived from the variable of firm competitiveness. In particular, following the estimation of a mean value[1] of firm competitiveness variable for all responses, the companies that exhibit higher level of competitiveness than the mean value, will be assumed to have a competitive advantage. On the contrary, the companies that exhibit a level of competitiveness equal or lower than the mean value will be assumed as not having a competitive advantage. Therefore, the variable of competitive advantage will be a dichotomous variable as it only takes two possible values, since a firm may either have competitive advantage, i.e. higher level of competitiveness compared to the industry's average competitiveness

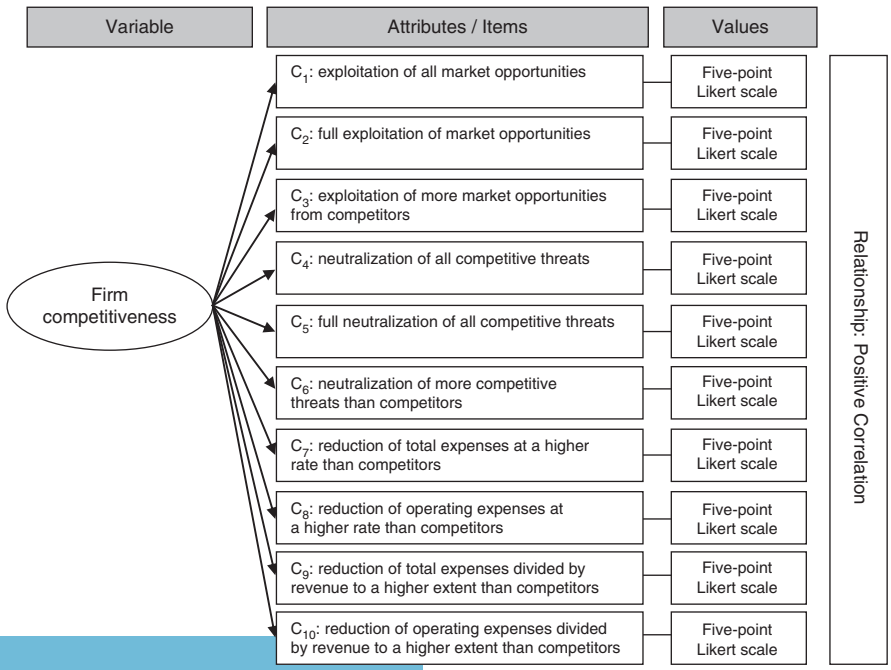

Figure 2.
Levels of measurement of firm competitiveness

level, or have no competitive advantage, namely an equal or lower level of firm competitiveness compared to the level of industry's average competitiveness.

6. Purifying the measure of competitive advantage

In an attempt to purify the newly developed measure of firm competitiveness and thus of the competitive advantage, a pilot study was administered to a sample of 130 firms that has resulted to 25 responses. The results of the pilot study suggest that items C_7 and C_8 as well as items C_9 and C_{10} of the measure of firm competitiveness are almost perfectly correlated since their correlation coefficient is equal to 1.0 and 0.918, respectively, in 99 percent confidence interval. For that reason, it is reasonable to assume that the attributes as measured by items C_8 and C_{10} do not capture any additional dimension or expression of a firm competitiveness construct. Therefore, we have decided to remove those items from the measure of firm competitiveness.

In addition, items C_3 and C_6 were considered to be part of the wider scale of items C_1 and C_4, respectively. In fact, the item that measures the degree to which a firm has exploited more market opportunities than competitors (C_3) is a fraction of the item that measures the degree to which a firm has exploited all market opportunities (C_1). For example, the strongly agree or agree responses in the five-point Likert scale for the "exploitation of all market opportunities" item are conceptually identical with the "exploitation of more market opportunities than competitors" item. As a matter of fact, there is no way for a respondent to agree with the statement that its firm has exploited all market opportunities and disagree with the statement that its firm has exploited more market opportunities from its competitors. The same syllogistic applies for the second dimension of firm competitiveness, i.e. neutralization of all competitive threats (C_4) and neutralization of more competitive threats than competitors (C_6). Therefore, we have decided to remove items C_3 and C_6 from the measure of firm competitiveness.

Following the removal of the items C_3, C_6, C_8 and C_{10}, the measure of firm competitiveness is left over with six items in total. In order to assess the validity of the purified measure of firm competitiveness, we used principal component analysis with varimax as rotation method. The results of the principal component analysis[2] to the six items of the newly developed measure of firm competitiveness show that items C_7 and C_9, which measure the various aspects of "reduction of costs" dimension, do not converge with the four items measuring the construct of firm competitiveness. In practice this means that the items C_7 and C_9 are not measuring the same construct as the rest of the items. Therefore, there is an indication that the dimension "reduction of costs" may not be a valid expression or manifestation of firm competitiveness and subsequently of competitive advantage.

Nevertheless, based on the above findings, we did not proceed with the removal of items C_7 and C_9 at this stage, due to two reasons. First, because the cases-per-variable ratio of 4:1, post removal of items C_3, C_6, C_8 and C_{10}, is lower than that which is regarded as adequate to derive stable components (Everitt, 1975; Cattell, 1978; Fabrigar *et al.*, 1999; Conway and Huffcutt, 2003), no compelling conclusions from principal component analysis' results could be drawn. The value of Kaiser-Meyer-Olkin measure of sampling adequacy test, which is equal to 0.471 and lower than 0.5, verifies the reason above as the number of pilot study's cases seems to be inadequate to run principal component analysis. Second, the items C_7 and C_9 have been used in past empirical efforts to measure the competitive advantage construct (see Newbert, 2008), although in different form, with well-documented reliability and validity.

Therefore, after all the above purifications, the items of the measure of firm competitiveness, and subsequently of competitive advantage, are being reduced from ten to six. The values of the remaining items, post purifications, are derived from a five-point Likert scale. Following the purification and refinement efforts, the levels of measurement of firm competitiveness variable are presented in Figure 3.

7. Assessing the validity and reliability of the measure of competitive advantage

The validity and reliability of the newly developed measure of firm competitiveness, and consequently of competitive advantage, was assessed using the data of a full study. Our data set is derived from questionnaires received from 268 respondents. Since all respondents are members of senior management that participate in the strategic management process of their firm, it is assumed that they are all highly qualified to provide accurate responses to the survey items.

According to Armstrong and Overton's (1977) guidance, in order to test for the presence of non-response bias, independent sample *t*-test and non-parametric independent sample Mann-Whitney *U* test were conducted to test whether statistical differences exist between mean and median of both the first 50 and last 50 respondents and first half, or early, and second half, or late, respondents. All statistics were insignificant, suggesting that the answers of the respondents and non-respondents do not differ, thus there is no non-response bias in the data of the full study.

Convergent validity

The assessment of convergent validity was carried out using principal component analysis with varimax as rotation method. The principal component analysis was selected because principal component analysis is more appropriate than common factor analysis when the objective is to discover the minimum number of factors needed to account for the maximum portion of the total variance represented in the items (DeCoster, 1998; Hair *et al.*, 2010). Orthogonal rotation of varimax was adopted since it provides a more clear separation of the components (Hair *et al.*, 2010) that is in line with the goal to obtain some theoretical meaningful components (Gunn and Williams, 2007) with, if possible, the simplest component structure (Hair *et al.*, 2010).

Before presentation of the results, we should mention that the value of Kaiser-Meyer-Olkin measure of sampling adequacy test is equal to 0.670, well above 0.5,

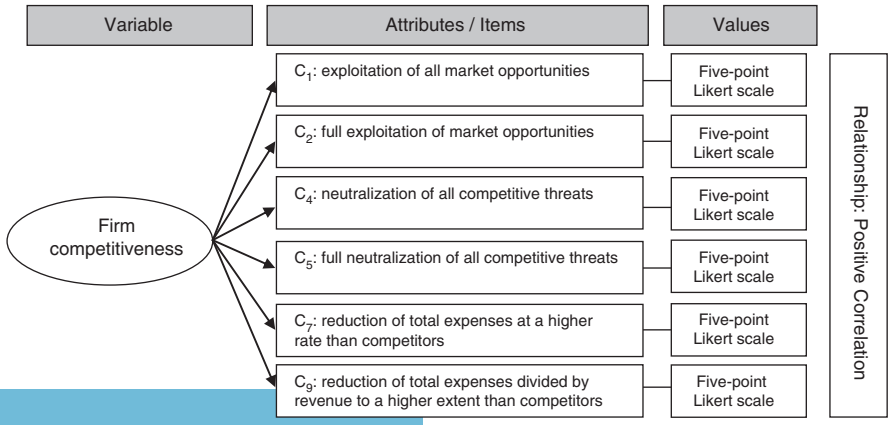

Figure 3.
Levels of measurement of firm competitiveness post measure purification

therefore sufficient (Kaiser, 1970; Kaiser and Rice, 1974; Hair *et al.*, 2010). In addition, Bartlett's test of sphericity is statistical significant, indicating sufficient corrections among items (Hair *et al.*, 2010). Furthermore, the cases-per-variable ratio, using listwise deletion method for missing values, is 10:1, which is meritorious to derive stable components (Everitt, 1975; Hair *et al.*, 2010).

The results of the principal component analysis for the items of firm competitiveness measure are presented in Table I. Two components were derived from the rotated component matrix instead of one that is essential in establishing a convergent validity, reaffirming the inconclusive pilot study results. In particular, the "reduction cost" dimension as measured by items C_7 and C_9, is not extracted under the same component as the rest of the items. Thus, the "reduction cost" dimension does not measure the same construct as the dimensions of "exploitation of market opportunities" and "neutralization of competitive treats." Therefore, the results of the full study's principal component analysis confirm the outcomes of the pilot study regarding the removal of "reduction cost" dimension from the measure of firm competitiveness, and of competitive advantage.

The review of literature in the strategic management field after the results of the principal component analysis, pointed out that the dimension of "reduction of costs" as proposed by Newbert's (2008) stipulative definition, which was based on Barney's (1991) statements relating to competitive advantage, had not been identified in Barney's article. Most likely, reduction of cost, as a latent expression of competitive advantage, was introduced by Newbert (2008) as part of his effort to develop the items used to measure competitive advantage construct following Kerlinger and Lee's (2000) guidelines. Thus, based on the above, we have removed items C_7 and C_9 and have rerun the principal component analysis for the remaining four items.

Before presenting the results of iterative principal components analysis, we should mention that the value of Kaiser-Meyer-Olkin measure of sampling adequacy test is equal to 0.670, Bartlett's test of sphericity is statistically significant and the cases-per-variable ratio, using listwise deletion method for missing values, is 67:1. Furthermore, the only one extracted component accounts for 67 percent of the total variance that is satisfactory given the 60 percent threshold set for social sciences (Hair *et al.*, 2010). Following the control of principal components analysis' assumptions or statistical requirements, the component loadings, presented in Table II, show that all items converge with items measuring the same construct, i.e. firm competitiveness. While

Items	Component 1 Loadings[a]	Component 2 Loadings[a]	Communality
C_1: exploitation of all market opportunities	*0.857*	0.057	0.737
C_2: full exploitation of market opportunities	*0.812*	0.104	0.671
C_4: neutralization of all competitive threats	*0.786*	0.191	0.654
C_5: full neutralization of all competitive threats	*0.769*	0.215	0.638
C_7: reduction of total expenses at higher rate than competitors	0.115	*0.929*	0.876
C_9: reduction of total expenses divided by revenue to a higher extent than competitors	0.197	*0.905*	0.857
Eigenvalue	3.071	1.362	4.433
Variance explained (%)[a]	44.3	29.6	73.9

Note: [a]From rotated component matrix (converged in three iterations)

Table I.
Principal components analysis for convergent validity assessment

such results would ordinarily provide strong evidence in support of the measure's validity, we also need to investigate the other types of construct validity, i.e. discriminant validity, concurrent validity and predictive validity.

Discriminant validity

In order to assess the discriminant validity of the newly developed measure of firm competitiveness, we needed to employ a measure of a second construct that in theory discriminates from the construct under investigation (Kerlinger and Lee, 2000; Trochim, 2006), i.e. firm competitiveness. The selected construct is the one of firm performance, because most scholars in strategic management acknowledge that competitive advantage and superior performance are conceptually distinct (Barney, 1991; Ma, 2000; Powell, 2001; Arend, 2003; Newbert, 2008; O'Shannassy, 2008). Furthermore, since competitive advantage, namely the above industry average competitiveness, and superior performance, namely the above industry average performance, are conceptually distinct, it follows that firm competitiveness and firm performance will be conceptually distinct too. Firm performance was measured via Delaney and Huselid's (1996) widely used subjective measure (Perry-Smith and Blum, 2000; Richard, 2000; Newbert, 2008) that includes both financial, i.e. sales growth, profitability and non-financial, i.e. marketing, market share, items or indicators. The items of the measure are positively coded such that the higher the response's score, the greater the firm performance.

The assessment of discriminant validity was carried out using principal component analysis with Promax as rotation method. Oblique rotation method of Promax was adopted since it allows correlated components instead of maintaining independence between the rotated components (Ho, 2006; Hair *et al.*, 2010). Based on the leading proposition in strategic management that superior performance arises from competitive advantage (Barney, 1997; Grant, 1998; Roberts, 1999; Durand and Vaara, 2009), we can advance to the conclusion that firm competitiveness and firm performance will be closely related, justifying the use of oblique rotation method. In support, the correlation of the two components that was extracted from principal component analysis is equal to 0.467, higher than 0.32, meaning that there is more than 10 percent overlap in variance among components, enough variance to warrant oblique rotation (Tabachnick and Fidell, 2007).

The value of Kaiser-Meyer-Olkin measure of sampling adequacy test is equal to 0.781, Bartlett test of sphericity is statistical significant and the cases-per-variable ratio, using listwise deletion method for missing values, is 33:1. In addition, the extracted two components, from the un-rotated component matrix since in oblique rotation methods the variance cannot be added (Costello and Osborne, 2005), accounts for 65 percent of the total variance. Given that the first four items in Table III

Items	Component 1 Loadings[a]	Communality
C_1: exploitation of all market opportunities	*0.844*	0.713
C_2: full exploitation of market opportunities	*0.808*	0.653
C_4: neutralization of all competitive threats	*0.814*	0.662
C_5: full neutralization of all competitive threats	*0.807*	0.652
Eigenvalue	2.679	2.679
Variance explained (%)[a]	67.0	67.0

Note: [a]From un-rotated component matrix

Table II.
Iterative principal components analysis for convergent validity assessment

Items	Component 1: competitiveness Loadings[a]	Component 2: performance Loadings[a]	Communality
C_1: exploitation of all market opportunities	*0.822*	0.454	0.682
C_2: full exploitation of market opportunities	*0.780*	0.486	0.627
C_4: neutralization of all competitive threats	*0.838*	0.314	0.710
C_5: full neutralization of all competitive threats	*0.829*	0.324	0.693
P_1: marketing	0.312	*0.674*	0.454
P_2: growth in sales	0.442	*0.868*	0.755
P_3: profitability	0.325	*0.753*	0.567
P_4: market share	0.384	*0.854*	0.729
Eigenvalue	3.840	1.376	5.217
Variance explained (%)[b]	48.0	17.2	65.2

Notes: [a]From rotated component structure matrix; [b]from un-rotated component matrix

Table III.
Principal components analysis for discriminant validity assessment

discriminate from last four items measuring the other construct, which is firm performance, and converge with items measuring the same construct, which is firm competitiveness, it is concluded that the newly developed variable is indeed a valid measure of the firm competitiveness construct.

Concurrent validity

Following the literature guidelines, the assessment of concurrent validity was carried out by correlating the newly developed measure of firm competitiveness construct with a second measure of the same construct but with a different method (Kerlinger and Lee, 2000). The selection of firm competitiveness measure as derived from a different method was based on the fact that there is no other existing qualified measure in the literature for firm competitiveness or competitive advantage (Sigalas and Pekka Economou, 2013). For that reason, consistent with the selected operational definition, we have developed a second variable for firm competitiveness based on Guttman scale. The second variable that was based on Guttman scale was developed because Venkatraman and Grant (1986) have argued that Likert and Guttman scales can be used as different methods in assessing the construct validity of a measure.

The variable of firm competitiveness with items measured by Likert scale, was constructed from the components scores of the principal component analysis, whereas the variable of firm competitiveness with items measured by Guttman scale, was constructed by averaging the scores of its items. Since the Z values of skewness and kurtosis of the two variable are <1.96 it is assumed that their distribution would not materially deviate from normal distribution (Hair *et al.*, 2010). For that reason, the correlation analysis was based on parametric Pearson product-moment correlation coefficient.

The correlation coefficient of the two variables measuring firm competitiveness with Likert and Guttman scaling method was found to be positive and statistical significant in confidence interval of 99 percent. In particular, it is equal to ca. 0.478 indicating a strong positive relation between the two variables, since in social sciences a correlation coefficient equal or higher than 0.5 signifies high relation (Cohen, 1988, 1992). Thus, in view of the fact that the two concurrent measures of firm competitiveness correlate well to each other, we can assume that the newly developed measure of firm competitiveness construct demonstrates concurrent validity.

Predictive validity

In order to assess the predictive validity of the newly developed measure of firm competitiveness, we needed to demonstrate that the construct under investigation predicts something it should theoretically be able to predict (Trochim, 2006). For that reason we used Delaney and Huselid's (1996) subjective measure of firm performance, because in strategic management literature it is well acknowledged that firm competitiveness, and subsequently competitive advantage, is positively related to its performance (Newbert, 2008; Durand and Vaara, 2009). The variable of firm performance, alike the variable of firm competitiveness, is operationalized from component scores as derived by principal component analysis in order to factor in the different weigh attributed to each item.

The relationship between firm competitiveness and firm performance was tested using ordinary least squares (OLS) regression model with firm performance as the dependent variable and firm competitiveness as the predictor variable. As can be seen from the results of these analyses reported in Table IV, the *F*-statistics of the regression model is significant, suggesting that the model fits the data well. The results also show that the model explains a considerable amount of the variance (23 percent) in firm performance. This specific empirical evidence seems to verify theory, which suggests that apart from firm competitiveness there are other exogenous factors to the firm that affect firm performance, such as luck (Barney, 1986b), governmental regulations (Baron, 1995; Bailey, 1997) and environmental shocks (Meyer, 1982). Furthermore, the parameter estimate for the predictive variable shows that firm competitiveness is significantly and positively related to firm performance. This finding, which is consistent with prior recent research (Newbert, 2008; Dibrell *et al.*, 2009; Liou and Gao, 2011; Ndofor *et al.*, 2011), suggests that the higher the level a firm competitiveness, the greater its performance.

In addition, as can be seen from the results in Table V, Ramsey Reset test with null hypothesis the linear functional form, White test with null hypothesis the residuals' homoscedasticity and Jarque-Bera test with null hypothesis the normality of the error distribution, are all statistically insignificant indicating that their null hypothesis cannot be rejected. In addition, Durbin-Watson test suggests that the null hypothesis of independence of error terms cannot be rejected. Therefore, all the assumptions underpinning OLS regression are been supported, suggesting that the parameters' estimators are unbiased, consistent and efficient.

Based on the above, the newly developed measure of firm competitiveness seems to be able to predict what it should theoretically be able to predict, i.e. firm performance, therefore establishing its predictive validity.

Variable	Unstandardized coefficients	SE	*t*-statistics	Sig.
Constant	0.004	0.054	0.076	0.939
C: firm competitiveness	0.475	0.054	8.767	0.000
F-statistics			76.865	
Sig. of *F*-statistics			0.000	
Number of cases (N)			264	
Pearson's correlation coefficient			0.476	
Sig. of pearson correlation coefficient (1-tailed)			0.000	
Coefficient of determination R^2			0.476	
Adjusted coefficient of determination R^2			0.227	
SE of the regression			0.881	
Sum of squares – residual			203.343	

Table IV.
OLS Regression analysis for predictive validity assessment

Reliability

Cronbach's α coefficient was computed to test the reliability of the firm competitiveness scale. Typically this coefficient, which is an estimate of the average of all the correlations of the items within a test (Cronbach, 1951), should fall within a range of 0.70-0.90 for narrow constructs and 0.55-0.70 for moderately broad constructs (Van de Ven and Ferry, 1979). But, the generally agreed lower limit for Cronbach's α is 0.70 (Cronbach, 1951; Nunnally, 1978), although it may decrease to 0.60 (Robinson *et al.*, 1991; Hair *et al.*, 2010).

In the full study, the Cronbach's α coefficient for firm competitiveness variable is equal to 0.84, suggesting that all of the items are reliable and the entire measure is internally consistent (Ho, 2006). In addition, the corrected item-total correlation for all items is higher than 0.33 criterion, indicating that more than 10 percent of the variance in the scale is accounted for by each item (Ho, 2006). Thus, all four items must be retained, since by deleting any of the four items will reduce the overall reliability of the scale (see Table VI). Therefore, the value of Cronbach's α coefficient indicates high overall internal consistency among the four items measuring firm competitiveness, and subsequently competitive advantage, construct.

8. Concluding remarks

In sum, this study has attempted to develop a reliable and valid measure of competitive advantage, by identifying a conceptually robust stipulative definition, composing a comprehensive operational definition and constructing a qualified variable.

Test/(statistics)	Statistics value	df	Sig.
Linear functional form, Ramsey reset test (*F*-statistic)	0.608	(1, 261)	0.436
Residuals homoscedasticity, white test (Obs*R^2)	4.382	2	0.112
Normality of the error distribution, Jarque-Bera test (Jarque-Bera statistic)	1.313	–	0.519
Test	Statistics value	Critical value d_L^a	Critical value d_U^a
Independence of error terms, Durbin-Watson	2.140	1.758	1.779

Table V.
Tests of OLS regression assumptions

Note: [a]From Durbin-Watson tables (level of significance: $a = 5$ percent, number of observations: $n = 200$ and number of independent variables: $k = 1$)

Variable	Items	Corrected item – total correlation	Cronbach's α if item deleted	Cronbach's α based on standardized items
C: firm competitiveness	C1: exploitation of all market opportunities	0.697	0.78	0.84
	C2: full exploitation of market opportunities	0.645	0.80	
	C4: neutralization of all competitive threats	0.665	0.79	
	C5: full neutralization of all competitive threats	0.656	0.80	

Table VI.
Reliability assessment

In particular, following the findings of its measure development process, the identified stipulative definition of competitive advantage can be further crafted as:

> […] the above industry average manifested exploitation of market opportunities and neutralization of competitive threats.

The above stipulative definition has been documented to be clearly stated and conceptually robust, given that it incorporates all the latent characteristics and particulars of the competitive advantage concept. In addition, it completely separates competitive advantage from the performance, since it does not incorporate any latent characteristics of the performance concept, or any judgments about its own value.

Based on the above stipulative definition, the results of cognitive interviews as well as the findings of the pilot and full study, the operational definition of competitive advantage can be rendered as:

> The above industry average manifested
> exploitation of:
> a) all market opportunities and b) full (exploitation of) the market opportunities,
> and neutralization of:
> a) all competitive threats, b) full (neutralization of) the competitive threats.

The above operational definition is considered to be ample, sound and comprehensive, given that it captures all the aspects of the different dimensions, or latent expressions, of competitive advantage. This operational definition can be used as the basis of valid measures of competitive advantage in empirical research. In particular, from the observable attributes, as has been described in the operational definition, we can create the items and the scales of competitive advantage variable.

This study has constructed the variable for measuring competitive advantage from the variable of firm competitiveness, because competitive advantage is a relational construct and therefore in order to be measured it must be compared with firm's industry level of competitiveness. The variable of firm competitiveness contains four items properly crafted from the observable attributes of competitive advantage's operational definition (see Figure 4 and Appendix). The variable of competitive advantage had been created by comparing each firm competitiveness with the average competiveness of its industry. The firms that exhibit a level of competitiveness higher than industry's average were assumed to have competitive advantage. Therefore, the variable of competitive advantage only takes two possible values, since a firm may either have competitive advantage, or not.

This paper contributes to the academic stream of strategic management by providing a measure of competitive advantage in order to test the research hypotheses, which employ the concept of competitive advantage, that to date remain tautological

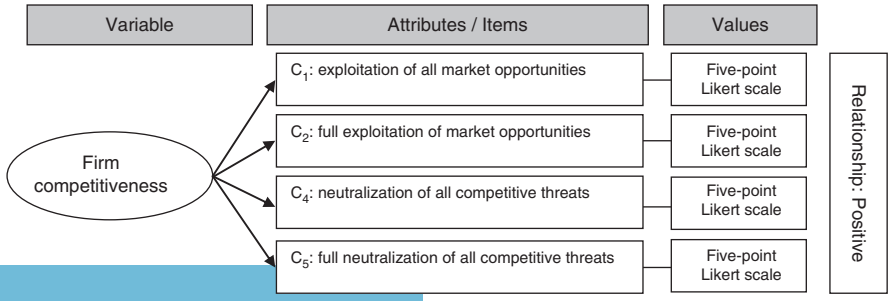

Figure 4.
Final levels of measurement of firm competitiveness

(Powell, 2001; Newbert, 2008; Tang and Liou, 2010; Sigalas and Pekka Economou, 2013). Our newly developed measure provides the empirical indicators of competitive advantage, which due to its latent nature is not directly measurable but its existence is indicated by other phenomena, e.g. exploitation of market opportunities and neutralization of competitive threats. The empirical indicators of our measure are not associated with performance thus the measure of competitive advantage does not contain any judgments about its own value or firm's performance. Therefore, our measure of competitive advantage can not only resolve the tautology of strategic management propositions, which employ the concept of competitive advantage, but also all the other problems and fallacies arising from its current conceptualization (see Sigalas and Pekka Economou, 2013). Newbert (2008) in his conceptual-level empirical investigation of the resource-based view of the firm has also contributed toward this end by operationalizing competitive advantage in a way that segregates firm competitive advantage from firm performance. However, Newbert's (2008) measure of competitive advantage is operationalized squarely for resource-based theory. On the other hand, we have developed a measure of competitive advantage that is free from performance antecedents and applicable under any leading theoretical perspective in strategic management, i.e. industrial organization perspective, market-led perspective, resource-based view and dynamic capabilities perspective. Conclusively, the findings of the paper provide academics and researchers with a valid and reliable measure of competitive advantage in order to empirically investigate the competitive advantage-related research hypotheses in the field of strategic management.

From a practitioner standpoint, the composed operational definition of competitive advantage can increase practicing managers' awareness relating to the conceptual nature of competitive advantage. The improved understanding of its conceptual nature by practicing managers, in turn, can specify the latent expressions of competitive advantage, describing what is and is not competitive advantage. This is extremely important because due to the confusion that competitive advantage, as an unobservable concept (Godfrey and Hill, 1995), causes to practitioners (Markides, 2000), the practicing managers may not be able to distinguish competitive advantage from other concepts, such as the sources of competitive advantage, i.e. firm's resources, a firm's capabilities, market positions or market barriers. Therefore, the findings of the paper provide practicing managers with the mapping of competitive advantage's manifestations or latent expressions.

Naturally, due to the lack of previous efforts to develop a measure of competitive advantage regardless of its underlying theoretical perspective that can resolve the problems and fallacies arising from its current conceptualization (Sigalas and Pekka Economou, 2013), the findings presented herein need further investigation. Although the statistical analyses described above suggest that the newly developed measure is in fact valid and reliable, because the measurement of competitive advantage, like all unobservable constructs, is inherently complicated (Godfrey and Hill, 1995), it cannot be concluded with certainty that no error exists in the measurement of this construct. Therefore, future scholars are encouraged not only to replicate this study, but also to test the qualitative aspects of construct validity, such as face and content validity, as well as to estimate other forms of reliability, such as inter-rater reliability, test-retest reliability and parallel-forms reliability. In addition, scholars wishing to replicate this study may nevertheless wish to examine convergent and discriminant validity using alternative methods, such as Campbell and Fiske's (1959) Multitrait-multimethod matrix, or more contemporary methods such as confirmatory factor analysis. Moreover, future scholars may wish to measure competitive advantage via alternative

metrics, scales and methods in an attempt to improve further the empirical content of this cornerstone construct of strategic management field.

In so doing, we as a scholarly community will have a more rigorous construct for competitive advantage by which to confirm, refine, supplement and/or refute the strategic management's fundamental hypotheses, thereby enriching our understanding of the role that competitive advantage plays in a firm performance as well as of what accounts for differences in performance across firms. Along this vein, shedding further light on the construct of competitive advantage coupled with new insights that will stem from empirically tested research propositions, will increase practicing managers' awareness relating to the latent expressions of competitive advantage and will navigate managers and practitioners in their quest to establish competitive advantage from their firms' resources, market positions and firm idiosyncrasies.

Notes

1. The mean value is equal to 0, since the data of firm competitiveness variable, as derived from components scores, is standardized with mean value of 0 and standard deviation of 1.
2. The results of pilot study's principal component analysis are not reported herein but are available upon request.

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Appendix. Scales of measures

Firm competitiveness (Likert scale)

Five-point Likert scale ranging from strongly disagree to strongly agree.

Over the past three years your competitive strategy has allowed your firm to:

- C_1 exploit all market opportunities that have been presented to your industry;
- C_2 fully exploit the market opportunities that have been presented to your industry;
- C_4 neutralize all competitive threats from rival firms in your industry; and
- C_5 fully neutralize the competitive threats from rival firms in your industry.
- $\alpha = 0.84$

Firm competitiveness (Guttman scale)

Select one of the following statements which best applies to your firm.

CII_1 Over the past three years your firm has:

(1) not exploited any of the market opportunities that have been presented to its industry;

(2) exploited some of the market opportunities that have been presented to its industry, but fewer in contrast to the opportunities that have been exploited by its main competitors;

(3) exploited more market opportunities from its main competitors; and

(4) exploited all the market opportunities that have been presented to its industry.

Select one of the following statements which best applies to your firm.

CII_2 Over the past three years your firm has:

(1) not neutralized any of the competitive threats from rival firms in its industry;

(2) neutralized some of the competitive threats from rival firms in its industry, but fewer in contrast to the competitive threats that have been neutralized by its main competitors;

(3) neutralized more competitive threats from its main competitors; and

(4) neutralized all the competitive threats from rival firms in its industry.

Firm performance (Delaney and Huselid, 1996)

Five-point equal intervals scale ranging from much worse to much better.

Compared to other rival firms in your industry, how would you evaluate your firm's performance over the past three years in terms of:

- P_1 marketing?
- P_2 growth in sales?
- P_3 profitability?
- P_4 market share?
- $\alpha = 0.80$.

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