Intangible and financial performance: causes and effects

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Abstract

Purpose – The purpose of this paper is to analyse the effect between intangible and tangible (i.e. financial) organizational performance as well as the effects of the crucial influencing factors “trust”, “strategic relevance” and “participation”.

Design/methodology/approach – Structural equation modelling is used to test a large-scale empirical study of more than 100 German business networks. Quantitative data are collected from the heads of the management accounting departments by means of a written questionnaire.

Findings – The results show an interrelation between intangible and tangible/financial performance that is mainly influenced by strategic relevance and participation. In contrast to other studies, trust is not found to have significant effects on tangible or intangible performance.

Research limitations/implications – As the study focuses on German business networks, country-specific effects cannot be excluded. Furthermore, no time-lagging effects have been revealed, as the data are only representative of a point in time. As the study is based on empirical data gathered by individual persons, it is open to general criticism of the broad empirical analysis methodology that is applied.

Practical implications – The study supports the selection of measures for performance management and the control of intangibles. It differs from prior studies in respect of its findings regarding the impact of trust on intangible and tangible performance; consequently, more research on this topic is essential.

Originality/value – This is one of the first studies that focuses on the prerequisites of intangible performance instead of investigating the correlation between different groups of intangible factors. Measures from social capital theory, as well as from organisational system design and strategic management, are integrated into this study.

Keywords Germany, Management accounting, Financial performance, Intangible assets, Management strategy

Paper type Research paper

Introduction

Numerous influencing factors have lead to enterprise-boundaries losing their character and alternative forms of organisation – in particular business networks – gaining increasing relevance (Parkhe, 1993; Ashkenas *et al.*, 1995; Child and Faulkner, 1998; Gulati, 1998). Business networks are regarded as a means with which to build competitive advantages. Strategy research approaches provide insights into specific aspects: according to the resource-based view, networks not only specifically support the generation of knowledge, but also link knowledge that is distributed among partners. Conversely, the market-based view emphasizes that markets and consumers' demands are better served by a flexible and distributed organization. However, in both approaches, intangible factors such as knowledge, customer relations, innovations, etc. play a major role in a network's success (Das *et al.*, 2003).

According to the contingency approach, various factors are likely to influence such intangible factors. One of the central challenges of intangible research is to,

respectively, provide evidence of links between intangible factors, intangible firm/network success and firm financial success. The aim of this paper is, therefore to investigate these interrelations in respect of business networks. Consequently, the underlying concept of business networks and intangible factors, as well as influencing factors (trust, participation and strategic relevance) are first explained. Thereafter, hypotheses are formulated with regard to a structural equation model that was tested on the basis of a large empirical survey in Germany. The paper concludes with the results of the empirical survey and a review of possible further research.

Research objective

A basic assumption of this research is that measurement leads to better understanding, better communication and better resource allocation, which eventually lead to better organizational performance. This assumption is in line with the concepts of intellectual capital measurement (Edvinsson and Malone, 1997; Stewart, 1997; Sveiby, 1997; Roos *et al.*, 1997) and performance management (Kaplan and Norton, 2004). The process of measurement not only describes a process or object's state at a certain point in time, but is also an intervention that contributes to improving organizational performance. Measurement allows organizational performance to be addressed directly, which allows for communication and interpretation that support organizational learning.

Obviously, the main challenge is to identify factors that have an impact on organisation performance, drive organisational performance (and thus effectively allow the organisation to be controlled or steered by means of a few selected indicators), performance driving factors or key performance indicators (Kaplan and Norton, 1992; Ittner and Larcker, 1998; Epstein and Birchard, 1999). The primary proposal is that these indicators deliver leading information to lagging financial performance. At present, the identification of the leverage points of an interconnected cause-and-effect framework is therefore one of the most important challenges to seriously manage intangibles and management in general – the “holy grail of management accounting” (Kaplan and Norton, 2004, p. 52).

The research objective is to enlarge the body of knowledge about whether and how intangible and tangible performances interact and how management and measurement could address this interaction. Recommendations in this regard should be of help both when selecting measures for performance management and with the control of intangibles.

Research framework

Networks

Networks represent a special form of organisation that is characterized by various fields of tension: autonomy and interdependence, trust and control, cooperation and competition, flexibility and stability, exploration and exploitation, etc. (Das and Teng, 2000). In particular, the new institutional economics' point of view reveals the special status of networks that move between the extremes of market and hierarchy in this perspective. Although the flexible orientation of networks inside these fields of tensions offers a high potential for success, the embodiment of a firm in a network is challenged by high variety and uncertainty of the business relations. In this context, intangible factors such as relations, knowledge, structures, etc. are crucial prerequisites for a network's successful functioning.

While business networks are regarded as a special form of cooperating (i.e. inter-enterprise cooperation), neither super-enterprise cooperations (like associations), nor intra-enterprise cooperation between corporate enterprises may be considered as business networks. The focus of business networks has to be the joint creation of products or services. The voluntary character of the formation of business networks seems to be of central importance, as many mechanisms can only work under this precondition (Tomkins, 2001). Decision constraints should, however, be regarded as another characteristic. With regard to the autonomy of decisions, the network idea of cooperation with partners for the fulfilment of goals no longer works, while the voluntary nature of the formation is foiled by total dependence between the network partners. Consequently, business networks are characterized by a partial decision constraint: a network partner cannot decide independently how to act in terms of marketing strategy, etc. The minimum number of partners that should comprise a network has also been a controversial topic (Jarillo, 1988). A minimum of three enterprises is suggested, as many effects only occur in “complex” organisational settings comprised of at least three partners: the building of coalitions or the ambiguous allocation of responsibility is, for example, only possible in situations that are not simple alliances of just two partners. The following definition summarises these key definition elements: an enterprise network is an inter-enterprise cooperation that is formed on a voluntary basis by at least three enterprises, which thus partially constrain their entrepreneurial autonomy.

Intangibles

During the last decades, a fundamental change has occurred in the resource structure of organizations. While the value creation process of traditional industrial enterprises was primarily based on physical assets and traditional production factors (property, raw materials, production facilities and labour), the value addition of modern organizations was achieved by the combination of immaterial production factors (such as innovations, information and communication technologies, and the quality of human resources) and the way of combining these resources (Lev, 2001; Teece, 1998; Spender and Grant, 1996).

As yet, it has not been possible to combine the different definition approaches to arrive at a positive definition of intangibles (Gröjer, 2001; Kaufmann and Schneider, 2004). As a result of the lack of a positive definition, several approaches were developed to categorize intangibles (Stewart, 1997; Edvinsson and Malone, 1997; Sveiby, 1997). In one of the most recent and comprehensive approaches, the Working Group on Intangible Assets of the Schmalenbach Society Working Group Accounting and Reporting of Intangible Assets – WGARIA (2005) suggests the following seven interdependent categories of intangibles: innovation, human, customer, supplier, investor, process and location capitals. The American Accounting Standard Setter, the Financial Accounting Standards Board (2001), also suggests seven categories of intangibles with slightly different emphases such as marketing-related, customer-related, artistic-related and contract-based intangible assets as well as technology-based assets (Kaufmann and Schneider, 2004):

- (1) *Innovation capital*. Innovation capital comprises the immaterial values in the field of product, service and process innovations. This category includes, for example, software development and patents, as well as an organization's

unprotected strategies. Innovation capital therefore relates to new products and services of customer-focused development. A positive influence can be provided by bundling partners' excellent innovation abilities, for example, by establishing a common technology centre or developing a common product and/or process development. Knowledge exchange and learning are frequently selected as some of the dominating reasons for forming a network.

- (2) *Human capital.* Human capital summarises an organization's immaterial values with regard to its personnel resources. Knowledge about network partners, social competence, jointly used knowledge databases, etc. are part of human capital.
- (3) *Customer capital.* Consumer capital comprises a network's immaterial values in the sales sector. Examples of consumer capital include: customer lists, market shares, customer satisfaction and brands and sales contracts. Customer capital can be substantially expanded by means of a network organization and is one of the most important reasons for participation in networks.
- (4) *Supplier capital.* On the purchasing side, all immaterial values that are based on supply relationships are integrated into the supplier capital. These values can be, for example, exclusive supply contracts for scarce resources.
- (5) *Investor capital.* From an enterprise's financial perspective, immaterial values can be characterized as investor capital. Investor capital mainly comprises the conditions under which network partners can obtain equity or credit capital. This can occur, for example, through a common credit rating that is valid for all network partners and which can provide all of them with credit worthiness.
- (6) *Process capital.* Process capital comprises the immaterial values that are determined by the efficiency of a network's process and structural organization. This includes, for example, a functioning distribution network, high-level quality control and a good communication network.
- (7) *Location capital.* The location capital includes all of an organization's location-relevant values. These location advantages include, for example, the existing infrastructure and good transport connections as well as tax advantages.

Research model

The seven categories describe the immaterial values comprehensively. Each immaterial value can be allocated to at least one of these seven categories. However, one value may be allocated to more than one category as the categories overlap one another. An efficient, just-in-time purchasing system can, for example, be classified as supplier capital as well as process capital. In this paper, intangibles are regarded as an entire set of resources and do not research the interrelations between the different categories. Past research – especially empirically oriented research – has focused on the interplay between the intangible categories (Bontis, 1998; Ordóñez de Pablos, 2002). Expanding this body of knowledge, the author on the influencing variables and the interrelations between tangible and intangible performance.

According to the contingency approach, the resource-oriented approaches of strategic management and the evolution theory, there are apparently pivotal factors that influence a network's performance. While a large number of studies can be found

on the impact of single qualitative factors on financial performance, the prerequisites of intangible and tangible performance in networks have to be investigated more extensively.

In recent years, social, client and network capital have been integrated into the concept of intellectual capital (Swart, 2006). While other authors have focussed on social capital as a network's core resource and have investigated how networks are linked with the creation of intellectual capital (Nahapiet and Ghoshal, 1998), a different stream of research is followed here. Based on a literature analysis, three of the possible influencing factors were selected – trust, participation and strategic relevance – that are mentioned as pivotal success factors (Mohr and Spekman, 1994; Oliver and Ebers, 1998; Dyer and Singh, 1998). In doing so, research on the social perspective of networks is not ignored, but a broader approach is taken into account by analysing the three main prerequisites of intangible performance from different theoretical viewpoints.

Constructs and hypotheses

Trust

Trust is a multi-dimensional concept that can be regarded as a “lubricant” for relationships (Luhmann, 2000). It is a precondition for, and plays a vital role in, relationships within networks (Anderson and Narus, 1990; Child and Faulkner, 1998; Das and Teng, 1998; Zaheer and Venkatraman, 1995). Gulati (1995) distinguishes between knowledge- and deterrence-based trust. The focus is on trust from a deterrence-based view. Hence, trust is defined as the reciprocal, positive expectations of other network partners in risk-entailing situations (Das and Teng, 1998).

Numerous theories provide insights into the impact of trust on performance. The author, however, follow the argumentation provided by both the new institutionalism (particularly the principal-agency and transaction theories) and game theory, which deduce the possibility of opportunistic behaviour due to behavioural uncertainty and the presence of asymmetric information in cooperative relationships (Gulati and Gargiulo, 1999; Chiles and McMackin, 1996). Behavioural uncertainty can be minimised by the development of reciprocal trust, which also reduces asymmetry in a relationship. It is presumed that a high level of trust affects all intangible categories: owing to the information flow being enhanced by the reduced information asymmetry, the level of intellectual/human capital increases. Consequently, through the more open exchange of customer, supplier and investor information between network partners, the position of all the partners may be enhanced in a particular category. Furthermore, open contact between the partners also leads to a better ability to coordinate processes inside a network. A high measure of trust is specifically a precondition for successful cooperation in the field of R&D, which constitutes all businesses' core competencies. The new institutionalism subsumes the above advantages by arguing that they lead to a reduction in transaction and agency costs, which makes a cooperative relationship more profitable – also in terms of financial performance (Jarillo, 1988; Das and Teng, 1998). Thus, owing to trust, a cheaper, more acceptable, less-time consuming and more flexibly designed (network) relationship is possible (Nooteboom, 2000; Larson, 1992).

In a network context, the non-cooperative game theory describes situations in which cooperating partners permanently fear that other partners could receive a bigger payoff due to their opportunistic behaviour (Hennart, 1991). An analysis of different game situations (e.g. the prisoner's dilemma and stag-hunt) arrives at the conclusion

that the alternative to cooperative behaviour is preferable in long-term relationships (Axelrod, 1984). Cooperative behaviour is based on trust, which works by means of the “shadow of the future” mechanism: expectations of future cooperation minimise incentives to generate short-term benefits through opportunistic behaviour (Parkhe, 1993; Nooteboom *et al.*, 1997). The line of argument that cooperative behaviour based on trust affects financial performance via intangibles (by reducing opportunistic behaviour) is similar to that of the new institutionalism.

Consequently, owing to the above-mentioned perceptions, successful networks should be distinguished by a high level of trust. This leads to the following hypothesis:

- H1.* The higher the trust between network partners, the higher the intangible network performance.

In an empirical study, Zajac and Olsen (1993) found that knowledge sharing, flexibility and adaptability are positively affected by trust, thus enabling partners to generate transaction value. Dyer and Chu (2003) found empirical evidence that trust not only reduces transaction costs and improves mutual information sharing, but also creates economic value in exchange relationships. Consequently, it can be hypothesized that:

- H2.* The higher the trust between network partners, the higher the financial network performance.

However, it must be pointed out that the development of trust is a long and costly process (Parkhe, 1993). Furthermore, there are risks attached to “blind trust”, for example, the unintentional outflow of know-how or the danger of losing a learning race (Gulati *et al.*, 2000). Despite these risks, the literature is mainly positive with regard to trust.

Participation

Participation is an instrument of the organisational system design and constitutes the staff's (here, network partners') participation in decision making and/or in decisions on a higher hierarchical level within the organisation. The efficiency and effectiveness of the decision making within a certain leadership pattern are considered pivotal for profit making. Consequently, it is distinguished between the extremes of “authority” and “participation”. In a network context, this is often reflected by network design: hierarchical networks, driven mostly by authorities, are referred to as focal networks with one powerful partner controlling the network. On the other hand, polycentric networks reflect a more democratic approach with the partners more involved in the decision-making process.

Participative decision making can strengthen commitment and enhance the innovation ability (innovation capital), the information and communication flow and the process capital (Hurley and Hult, 1998; Sashkin, 1997; Dwyer *et al.*, 1987; Moorman *et al.*, 1992). According to game theory, it can be argued that joint decision making will enhance commitment to a network and interest in the potential joint results, which will in turn reduce the possibility of opportunistic behaviour. On the other hand, the possibility of identifying opportunistic behaviour will be increased (Saxton, 1997). Again, there is the line of argument that a high degree of participation strengthens the intangible performance, which in turn decreases transaction costs and increases the transaction value. According to agency theory, information asymmetry can be reduced through participation if the partners participate in strategic decisions

and operative actions. For (inter-)organisational learning theory purposes, close involvement is required within a network (as well as in its decision-making processes) in order to acquire partner knowledge (Saxton, 1997). It was empirically proven that there is a positive link between participation and learning and the possibility of innovation (Hurley and Hult, 1998). Thus, strong participation in a network can have a positive effect on reciprocal learning and especially on the human capital. Thus, it is posited:

- H3.* The stronger the participation in a network, the higher the intangible network performance.

In a strategic alliance context, it was demonstrated that joint decision making has a positive effect on partner and alliance performance (Saxton, 1997). However, one presumes that in participative networks, coordination becomes harder and more complex due to the numerous coordination processes. Again, arguments for participation's positive effect on network performance predominate. In this regard, the following hypothesis is formulated:

- H4.* The stronger the participation in a network, the higher the financial network performance.

Strategic relevance

Based on theoretical strategic management approaches, vital success potentials can be identified that can and should be exploited via networks: extending market power, defending competitors, building new markets, overcoming growth-limiting resource deficiencies, etc. The strategic relevance of networks for partners is derived from these profit potentials. Therefore, if partners highly value the strategic relevance of a network to achieve their strategic business goals, they will foster network performance, as there is a strong congruence between network goals and partner goals.

Within strategic management, a distinction is generally made between the externally oriented market-based view and the internally oriented resource-based view: the market-based view explains companies' success as due to the strength of their market position. Companies can multiply their market power via business networks, can ward off new competitors, define and set market standards, develop and conquer new markets more rapidly and cost effectively and enlarge the scope of their business by pooling complementary activities (Spekman *et al.*, 1998).

The resource-based view focuses on the notion that firms' heterogeneous resource architectures are the primary sources of economic rents and are, therefore, the drivers of both organisational performance and competitive advantage (Penrose, 1959; Barney, 1991). According to this view, a competitive advantage can be achieved by possessing unique, difficult to imitate and hard to substitute resources regardless of whether these are tangible or intangible (Wernerfelt, 1984; Teece, 1998). Lev (2001) characterises intangibles as difficult to trade and points out the lack of efficient markets for these intangible resources. Consequently, business networks are the most appropriate way of enabling the separation of companies' resources, which may overcome growth-constraining resources deficiencies. Sustainable competitive advantages may also result by combining complementary resources (D'Aveni, 1995; Das and Teng, 2000). In order to exploit these competitive advantages and realize their financial value,

partners must not only combine their core resources in an idiosyncratic way, but must also regard their network as a critical resource.

Intangibles are often regarded as a special sort of resource that directly or indirectly affects firm performance. Hence, it can be argued that a strong perception of a network's strategic relevance for the partners is both a prerequisite for intangible performance, as well as financial performance, which leads to the following hypotheses:

H5. The greater the strategic relevance of a network for the partners, the higher the intangible network performance.

H6. The greater the strategic relevance of a network for the partners, the higher the financial network performance.

According to game theory, it can also be argued that all partners will individually compare their benefits without and with the network – the “shadow of future”. Thus, a positive expectation with regard to both the future and the network's strategic relevance supports cooperative behaviour. It could be empirically proven that the “shadow of the future” has a positive impact on performance (in the sense of outcome) (Parkhe, 1993). Hence, a network's strategic relevance is regarded as relevant with regard to performance.

Intangible and tangible performance

The resource-based view of strategy mentions three conditions for resources to create enduring competitive advantages: resources have to be valuable, rare and imperfectly imitable (Barney, 1991). In the special context of a networked company and from a marketing-based view, it is argued that a product's greater value and, hence, higher level of performance are achieved by means of networked, market-based assets (Srivastava *et al.*, 2001). The general advantage of a network company compared to that of a single firm is that immaterial assets and/or intangibles are regarded as the preliminary control measures for a network's success. Improvement in the achievement of goals in the previously mentioned seven categories can be regarded as immaterial success. This is how network success can be enhanced through the bundling of excellent innovation abilities (innovation capital). A higher human capital (through better relations between the partners' employees) can contribute to material network success through better cooperation, better processes, etc. In the context of customer, supplier and investor capital, relationships with the associated partners can be enhanced qualitatively and broadened quantitatively, thereby augmenting network success. Furthermore, the optimization of network mechanisms and structures (structural capital in other intangible definitions) can support employees in their quest for optimum intellectual performance and, therefore, overall business performance (Bontis, 1998). Consequently, immaterial success can be regarded as a potential for success that facilitates above average yields. Concerning empirical results, Das *et al.* (2003) conclude that the success of strategic partnerships is generated by building intangibles. This leads to the following hypothesis:

H7. The higher the network's intangible performance, the higher the financial network performance.

In cooperation research, there are many performance measures and criteria: one approach is to use subjective measurement dimensions such as the business partners' "perceived satisfaction" or "achievement of objectives". Others use objective measurement dimensions like profitability or growth (Mohr and Spekman, 1994). For a synopsis of empirical studies on alliance performance and the underlying concepts of success, see Das and Teng (2002). The study relied on the first concept: measuring networks' success by the subjective valued individual performance of the participating firms. The interviewees were asked to indicate the degree to which objectives were achieved in the following dimensions: "value creation", "increase in profit" and "sales growth".

Path model

The research framework contains two groups of variables: influencing factors as independent variables and network performance (intangible and tangible) as dependent variables. It is always referred to tangible network performance as financial performance. Intangible performance is measured by using the multi-dimensional approach of the WGARIA. Each influencing factor's effects is hypothesized with regard to intangible as well as financial/tangible performance. This is not only a logical consequence of the hypothesized effect on intangible and tangible performance, but it also allows to analyse and compare the intensity of the effect in the empirical analysis (Figure 1).

Sample and data collection

The research framework was tested by means of a large empirical study conducted in Germany. The data collection were carried out by means of a fully standardised, written questionnaire. This questionnaire had been carefully tested in two rounds of pre-tests, in which the design of the questionnaire, the content and the design of the questions had been optimised in terms of comprehensibility, understanding, alignment, etc. (Rossiter, 2002). The identification of the target population was based on the results of an evaluation carried out by the German Federal Statistical Office in 2003. Besides, other cooperation forms, this study also analyses the spread of business networks (networking), which are obviously the dominating form (15.6 per cent) when compared to franchising (9.7 per cent) and joint ventures (6.7 per cent) (DESTATIS, 2004). Two results from this study were of relevance for this survey's unit of definition: first of all, no significant clustering could be found in a particular industry.

Figure 1.
Research framework

Consequently, a cross-industry study was conducted. Second, the German Federal Statistical Office survey established that the occurrence of business cooperation correlates significantly with the participating company's size. In the category of companies with 250 and more employees, at least 60 per cent were involved in cooperations, whereas the average number of cooperating businesses in the smaller categories was substantially lower. Large companies were therefore identified as the target group of this study and all large and middle-sized enterprises in Germany were defined as the parent population.

The conditions allowed for a complete inventory count to be undertaken, which came to a total of 5,717 companies. The heads of management accounting departments were defined as the key informers for the evaluation due to their expertise. The questionnaires were addressed to them personally, and if their names were not known, the company executives were addressed personally. Altogether, 120 questionnaires were returned. In total, 11 questionnaires had to be discarded due to their high number of missing values. The following results are based on the remaining 109 questionnaires. The actual rate of return equals 1.9 per cent. Assuming that the German Federal Statistical Office survey (DESTATIS, 2004) had a return rate of 10.6 per cent in respect of the spread of networks within businesses with more than 250 employees, an adjusted rate of return of 17.9 per cent is achieved in this study. This is an acceptable value[1]. Nevertheless, the representativeness of the following analysis should be regarded as having limitations. However, considering this study's role as the first large-scale empirical study regarding business networks, and its proof of an interrelationship between intangible and tangible performance, its limitations are also acceptable.

Results

Measures

First, measurement tools for the construct operationalisation were developed (see the Appendix, Tables AI-AV). There are no comprehensive theories within the field of networks and only partial aspects are thus touched upon. As a result, each measurement is incomplete and contains errors. Consequently, reflective measurements were carried out (Diamantopoulos, 1999). Considering that there will be mistakes in the measures, reflective measurements were preferred to formative ones. All indicators were measured by means of closed questions via five-point Likert scales (Table I).

The factor reliability clearly exceeds the required minimum value of >0.6 . Constructs' reliability also mostly fulfils the required minimum occurrence of

Construct	Cronbach's alpha	Variance explained	Factor-reliability	Average variance extracted
Trust (three items)	0.74	0.66	0.79	0.56
Participation (three items)	0.68	0.62	0.71	0.47
Strategic relevance (three items)	0.74	0.83	0.84	0.63
Tangible performance (three items)	0.78	0.69	0.79	0.56
Intangible performance (seven items)	0.78	0.44	0.78	0.35

Table I.
Construct measurement

Cronbach's alpha of > 0.7 for all constructs, except the participation construct. The same applies to the recorded average variance extracted, which is mostly higher than the required value of > 0.5 . The necessary minimum of > 0.5 , with regard to the explained variance, is also achieved. Only the intangibles' performance displays substantially lower values. Despite the partial shortfall of one required fit index, the measurement quality of all constructs is, on the whole, considered acceptable. The discriminant validity was tested by the Fornell-Larcker ratio. All construct pairs fulfil the Fornell-Larcker ratio < 1 (Table II).

Hypotheses testing

The model was tested with AMOS 5.0. On the whole, the global fit indices resulted in a satisfying model fit. The quotient of χ^2 and degrees of freedom is 1.268, the RMSEA is 0.052 (with LO90: 0.022 and HI90: 0.074), the adjusted goodness-of-fit index (AGFI) is 0.799 and the CFI is 0.943. All the fit indices allude to a good model fit. In order to test the hypotheses, both direct and total effects were calculated. The total effect was calculated as the sum of direct and indirect effects. The direct effect was defined as the standardised path coefficient for the direct relation between two variables. The indirect effects were defined as a relation between two variables over one or more intermediate variables. The measure of indirect effects was acquired by multiplying standardised path coefficients followed by the addition of all path results between two variables. Five of the seven formulated hypotheses could be temporarily confirmed within the empirical study. Owing to the low rate of return, the study's representativeness is limited and its implications only represent a tendency (Table III).

Findings

The strongest effect in the model is from intangible to tangible/financial performance (H7). If companies perceive the network performance in terms of intangibles as high, the monetary outcome is also above average. Strategic relevance has a great impact on the intangible performance and a minor effect on financial performance (H5 and H6). When establishing a network or adding a partner, it seems to be crucial to carefully select the partners in order to ensure that the strategic relevance of the network is high for all partners. If the relevance of the network is high for all partners, performance can be increased. As strategies are ways to turn abstract value propositions into monetary

		Strategic relevance	Participation	Trust	Intangible performance	Tangible performance
	DVE	0.64	0.47	0.56	0.35	0.56
Strategic relevance	0.64					
Participation	0.47	0.05				
Trust	0.56	0.06	0.60			
Intangible performance	0.35	0.63	0.30	0.07		
Tangible performance	0.56	0.29	0.16	0.07	0.66	

Table II.
Fornell-Larcker ratios for
the model

Note: AVE – average variance extracted

Table III.Results of the hypotheses
testing and effects
in the model

Hypothesis	Path	Direct effect	Indirect effect	Total effect
H1(+)	Trust $\Rightarrow$ intangible performance	-0.11	0	-0.11
H2(+)	Trust $\Rightarrow$ financial performance	0.04	-0.05	-0.01
H3(+) ^a	Participation $\Rightarrow$ intangible performance	0.32	0	0.32
H4(+) ^a	Participation $\Rightarrow$ financial performance	0.09	0.16	0.25
H5(+) ^a	Strategic relevance $\Rightarrow$ intangible performance	0.44	0	0.44
H6(+) ^a	Strategic relevance $\Rightarrow$ financial performance	0.15	0.22	0.37
H7(+) ^a	Intangible performance $\Rightarrow$ financial performance	0.50	0	0.50

Notes: The specified effects are based on standardised mapping coefficients; ^ahypothesis preliminary confirmed

value added, the effects reflect the following outcome: the effect on intangible performance is nearly triple that on tangible performance. This is in line with a wide stream of research that focuses on strategy implementation besides strategy formulation (Kaplan and Norton, 1996, 2000b). However, regarding a network as a core strategic asset and developing strategies for its optimization are not sufficient for financial network success. The transformation of strategy into certain tasks and actions by the company's intellectual structure is a pivotal factor in order to enable financial performance. Therefore, the structures and potentials inherent in a company's intangible value potential are prerequisites for turning a commonly understood strategic relevance into financial outcome for the network (Figure 2).

While strategic relevance is mainly relevant as a pre-contractual mechanism, participation is relevant for the working phase (Dwyer *et al.*, 1987; Jap and Ganesan, 2000). The effects are more or less the same (*H3* and *H4*): a strong effect towards intangible performance and a low-effect towards financial performance. The argument is very similar: a high degree of partner participation creates an environment in which intangible value potentials can grow and unfold their value generation potential, which can later be utilized and turned into financial performance.

In contrast to other studies, trust was not found to have effects on tangible or financial network performance (*H1* and *H2*). The fact that the operationalisation of the construct is unable to reflect all the complex mechanisms in networks is inherent in the research methodology. The different levels of risk exposure in trust-based cooperations

Figure 2.
Path diagram and effects
of the model

especially lead to the possibility of asymmetric power balances and hold-up problems (Das and Teng, 1998, 2002; Das *et al.*, 2003). In particular, there can be serious problems concerning fraudulent behaviour of a certain partner in cooperations with more than two partners (as determined by the network definition and applied in this study). Free-riding behaviour could therefore be an issue preventing partners from trust-based behaviour. Consequently, trust cannot be regarded as generally positive with respect to intangible performance.

Another reason for the negative effect of trust on intangible and tangible performance may result from a key informant bias. A distinction should be made between trust and trust-like behaviour, especially in the context of opportunism (Rindfleisch and Heide, 1997). Although the heads of the management accounting departments are well informed about the kinds of relationships that exist in terms of strategic relevance and direct measurable indicators like product quality, delay in delivery and financials, they may not assess a relationship in terms of trust and opportunism. Although they were chosen as appropriate informants for this study, due to their holistic knowledge of tangible and intangible performance, other persons could also be good key informants, especially with respect to cooperation and trust issues. Different functions (accounting, strategy departments, etc.) could possibly have different views on the importance and performance of intangible factors regarding a company's success, especially in the context of networks. More research is definitely needed to develop an actor-specific perspective.

Limitations

Since the study is based on empirical data gathered by individual persons, it is subject to all the criticism related to the general methodology of broad empirical analysis. Obviously, intangibles and all other constructs are measured on a highly aggregated level. In order to avoid misunderstandings, existing measurement scales were used and extensive pre-tests were carried out prior to the study. The construct measurements indicate that measurement instruments are reliable and valid, but as described above, a key informant bias cannot be ruled out completely. While all other fit indices indicated acceptable model fits, the AGFI is not satisfactory. However, according to the literature on the AGFI, an overly strong correction for model complexity is considered to be suspect (Marsh *et al.*, 1988). Generally, research was limited to these three described factors. However, additional constructs might, of course, be useful for further studies.

As noted, the representativity of the data are not clear due to the ambiguous overall number of addressed networks. A potential follow-up problem is therefore that it can only be ensured that the respondents who answered the questionnaire were active in 106 different networks. Theoretically, it is possible that two or more respondents participate in the same network, which could also affect representativity. Consequently, the results of the structural equation analysis have to be interpreted in the light of these limitations. Finally, generalisations of the results only seem possible to a limited extent, as they also depend on cultural aspects. Since only German business networks were researched, the transfer to other cultural environments should be undertaken with caution. As demonstrated by Hofstede, cultural aspects significantly influence personal interrelations and in turn probably also affect business relations. However, these general issues were accepted in order to gain insight into the interplay of business networks' intangible and financial performance.

Relation and interaction between intangible and financial performance

Intangible performance indicators are obviously of high value for indicating monetary performance. However, the mode of the effect is uncertain: is it a leading-lagging effect or a cause-and-effect relation? From the statistical results, it is only possible to derive a strong correlation between the two constructs. Intangibles are mostly regarded as structures rather than precise value adding activities (resulting in the well-known phrase “intangible value drivers”) that indicate cause and effect relations (Abeysekera, 2006). The balanced scorecard (BSC), which is the most common example of an advanced performance measurement system (Ittner and Larcker, 1998), assumes that there is a cause-and-effect relationship between intangible assets and firm performance within its four perspectives (financial, customer, internal processes, learning and growth). As a further development, Kaplan and Norton suggest moving away from presenting BSCs in a four-box model. Instead, they suggest building strategy maps as visual representations of how intangible assets are converted into tangible outcomes (Kaplan and Norton, 2004). This provides assumptions about causal relationships that can then be tested (Kaplan and Norton, 2000a, b). The cause-and-effect relations are regarded as crucial for the BSC and strategy map concept, but are also discussed controversially (Norreklit, 2000). In the interaction context, the time aspect is also relevant: the (intangible) structures usually take time to utilize, for example, for a customer database or a good customer relationship. Therefore, a leading-lagging effect between intangible and tangible performance is generally assumed, which could be proved in the researched model.

Ittner and Larcker (2003) call for causal models to be developed and verified in order to analyze how intangibles impact business performance (Roos *et al.*, 1997, p. 82). But what exactly are these causal links? On which level of detail do they appear? The application of value driver trees is commonly practiced in order to determine business performance, which could be watched especially at the many, already broadly differentiated concepts of value-oriented business control. In addition, the seven categories of intangibles can be operationalised with single value drivers. Following this approach, there are two possibilities for the link between intangible and financial performance drivers:

- (1) *Independent view.* The material and immaterial value creation is analyzed independently and calculated with independent valuation concepts. Cause-and-effect relations and calculations do not overlap. After the independent valuation of intangible and tangible values has been carried out, the two key measures can eventually be related. The result is a financial key performance indicator (e.g. EVA) and an intangible key performance indicator (e.g. VAIC) or a bundle of key performance indicators (as in the underlying concept of this paper, the WGARIA).
- (2) *Integrated view.* Although the value drivers are not divided into tangible and intangible value drivers, there is an integrated observation of a driver “pool”. These value drivers influence both tangible and intangible value creation. Not only can the value drivers’ cause-and-effect relations on intangible and/or tangible key performance indicators be demonstrated, but also the effects (in the sense of control loops) of the intangibles categories can be identified on the tangible valuation components. Certain value drivers may be part of tangible as well as intangible cause-and-effect relations (Figure 3).

Figure 3.
Interactions between
intangible and
tangible/financial
performance

Both approaches underline the basic problem of intangibles research: generally, an “either or” instead of an “as well as” occurs when analyzing the effects of value drivers (Bassi and van Buren, 1999). In order to justify the intangible approach, a strict (and artificial) differentiation of material concepts of success must take place. Consequently, a large number of approaches for the valuation of intangibles follow the independent view approach: intangibles are regarded as being mostly independent of financial value drivers and a separate instrument is developed for this part of the value creation. A closer inspection of the intangible categories reveals that such strict (artificial) differentiation is unrealistic (Gröjer, 2001). Many of the introduced intangible key figures find themselves utilized in financial/value-oriented concepts as well. The results of this study demonstrate, through the example of the value drivers “strategic relevance” and “participation”, that they effect the intangible as well as the financial performance through experience effects. A total separation of the valuation of intangible and financial measurement models would therefore not account for what occurs under real circumstances. The integrated view approach seems to provide a better representation of reality and the special challenges of intangibles research. In addition, the function of intangibles is clear: they can be regarded as an intermediate state (in the form of an outcome) on the way to turning performance drivers into financial performance or output.

There is special meaning in the integrated approach that lies in the proof that there is a relationship between intangible components and financial performance. Here, the underlying categorisation (WGARIA, IFRS, Edvinsson/Malone, etc.) is of less importance. This investigation could provide evidence that there is a strong interrelationship on a highly aggregated level (i.e. in the overall concept of the seven categories) between intangible and financial performance. However, it should be taken into account that causal relations can work both ways: financial performance can influence the intangible performance and vice versa. By investing in R&D, innovation capital can be built that will later (it is hoped) lead to financial performance.

Likewise, investors' better credit conditions, which are achieved through better investor relations, can directly increase financial performance. More research in this area may show the factors that have to be monitored substantially. Therefore, the level of detail must be increased gradually in order to show single cause-and-effect relations. An aggregation of intangible categories and the investigation of their effects on financial performance are only heuristic devices that serve to reduce the complexity of reality (Gröjer, 2001). The direct effects on the level of value drivers seem to be a significantly more realistic method for reducing complexity. In addition, influencing factors should be considered and an assessment should be made as to whether their influences are mediating or moderating.

Discussion

The study aims to find an explanation whether and to what extent financial performance is influenced by intangible performance in business networks by considering the three influencing factors (trust, participation and strategic relevance) on the two dimensions of performance (tangible and intangible). Based on arguments found in new institutionalism, strategic management approaches and game theory, a structural equation model containing theoretically derived cause-and-effect relationships was tested by means of a large empirical study on business networks in Germany. Strong evidence was presented for a relationship between tangible and intangible performance, which is measured as a construct of seven categories. Strong effects were confirmed for the relations between strategic relevance and participation with regard to intangible performance. Minor effects were measured for the interrelation between strategic relevance and participation with regard to intangible performance. Contrary to other studies, no significant effect was measured for the relation between trust and performance.

Although the performance hypothesis could be proven, this proof gives rise to further questions concerning the exact mode of the interrelationship between intangible and tangible performance. First, there should be a time lag between intangible and tangible performance that could only be proven by means of longitudinal studies. Second, an analysis should be undertaken on a deeper level of detail regarding the causes and effects of the interrelation between intangible and tangible performance. Two modes were discussed: an independent and an integrated view, representing whether the value drivers affect only one value (intangible or tangible) or both.

The results of this study suggest that the influencing factors affect both intangible and financial performance. When focusing on the strength of the effect, the two influencing factors "strategic relevance" and "participation" have an approximately three times stronger effect on intangible performance than on financial performance. Further analysis can provide more detailed insights into which intangibles are influenced by which factors and how strongly.

Surprisingly, this research model could not prove that trust has any effect on intangible or tangible performance. Apparently, trust does not cause performance enhancement *per se*, only under certain circumstances. The differentiation of trust, into "emotional – personal" and "strategic – calculated" trust, in the scientific discussion provides an explanatory approach (Williamson, 1993; Ring and van de Ven, 1994; Chiles and McMackin, 1996; Carson *et al.*, 2003; Nooteboom, 2004). The effects of trust

are of a considerably more complex nature, especially due to the possibilities of building coalitions inside a network. An unambiguous attribution of avoidance of uncertainty or opportunism is complicated by the network partners' strategic considerations. Consequently, a differentiated reflection on the topic of "trust" in the context of intangibles and networks seems necessary and promises to be rewarding.

Note

1. The value is calculated as follows: only 10.6 per cent of all 5,717 businesses participate in networks. The result is a corrected theoretical basic total of 606 businesses that cooperate within the whole population. The theoretical reflux rate is calculated as $109/606 = 17.9$ per cent. There is a possible bias resulting from the study not being able to ensure if/that more than one answers did not refer to the same network.

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Table AI.
Construct measurement
“trust”

Trust	Item-to-total correlation	Indicator reliability	t-value
The fairness and honesty of network partners is extremely high	0.50	0.69	
Emerging problems and conflicts are addressed openly	0.66	0.53	7.24 *
The partners fulfil their duties, even if they are not controlled	0.54	0.43	5.42 *
Cronbach's alpha			0.74
Variance explained			0.66
Factor-reliability			0.79
Average variance extracted			0.56
Note: *Significance level at 0.001			

Table AII.
Construct measurement
“participation”

Participation	Item-to-total correlation	Indicator reliability	t-value
Ideas and proposals can be introduced by each partner	0.38	0.2	
Relevant knowledge is utilized by network management	0.64	0.87	3.11 (0.002)
Knowledge gets distributed openly and freely across enterprise borders	0.52	0.39	3.99 *
Cronbach's alpha			0.68
Variance explained			0.62
Factor-reliability			0.71
Average variance extracted			0.47
Note: *Significance level at 0.001			

Table AIII.
Construct measurement
“strategic relevance”

Strategic relevance	Item-to-total correlation	Indicator reliability	t-value
If the cooperation would end, it would be difficult for the partners to fill the resulting revenue gap	0.58	0.39	
The strategy of the partners is tied strongly to the network	0.76	0.82	6.23 *
The evolvement of the network is crucial for the evolvement of the partners	0.72	0.69	6.39 *
The partners are dependent on the network		Eliminated	
The network enables an otherwise impossible entry to a market		Eliminated	
The partners cannot afford to dissolve the network		Eliminated	
Cronbach's alpha			0.74
Variance explained			0.83
Factor-reliability			0.84
Average variance extracted			0.64
Note: *Significance level at 0.001			

Financial performance	Item-to-total correlation	Indicator reliability	t-value	Intangible and financial performance
Do you achieve the objectives regarding the value creation (degree of objectives' achievement)	0.51	0.46		
Do you achieve the objectives regarding the increase in profit (degree of objectives' achievement)	0.67	0.75	5.47 *	245
Do you achieve the objectives regarding the sales' growth (degree of objectives' achievement)	0.60	0.45	5.62 *	
Cronbach's alpha			0.78	Table AIV. Construct measurement "performance"
Variance explained			0.69	
Factor-reliability			0.79	
Average variance extracted			0.56	
Note: *Significance level at 0.001				

Intangible performance	Item-to-total correlation	Indicator reliability	t-value	
To what extent have improvements regarding innovations (products, services and processes) resulted from participation in the network?	0.40	0.17		
To what extent have improvements regarding human resources resulted from participation in the network?	0.63	0.49	3.69 *	Table AV. Construct measurement "intangible performance"
To what extent have improvements regarding sales resulted from participation in the network?	0.47	0.24	3.30 *	
To what extent have improvements regarding procurement resulted from participation in the network?	0.44	0.28	3.26	
To what extent have improvements regarding finance resulted from participation in the network?	0.62	0.55	3.51	
To what extent have improvements regarding organization resulted from participation in the network?	0.56	0.44	3.51	
To what extent have improvements regarding location resulted from participation in the network?	0.42	0.29	3.18	
Cronbach's alpha			0.78	
Variance explained			0.44	
Factor-reliability			0.78	
Average variance extracted			0.35	
Note: *Significance level at 0.001				

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